EXHIBIT W

Voting by Mail and Ballot Rejection:
Lessons from Florida for Elections in the Age of the Coronavirus

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ABSTRACT

The COVID-19 pandemic and its concomitant need for social distancing have increased the attractiveness of voting by mail. This form of voting is nonetheless not a panacea for election administration in the time of a public health crisis, as a widespread move to ballots cast by voting by mail risks exacerbating existing inequities in mail-in ballot rejection rates across voters and jurisdictions. This motivates our examination of the roughly 9.6 million and 8.2 million ballots cast in the 2016 and 2018 general elections in Florida, respectively, including over 2.6 million vote-by-mail (VBM) ballots cast in each. Using a selection model that analyzes all ballots cast and those VBM ballots not counted in Florida in these two elections, we find that younger voters, voters not registered with a major political party, and voters in need of assistance when voting are disproportionately likely to have their VBM ballots not count. We also find disproportionately high rejection rates of mail ballots cast by Hispanic voters, out-of-state voters, and military dependents in the 2018 general election. Lastly, we find significant variation in the rejection rates of VBM ballots cast across Florida's 67 counties in the 2018 election, suggesting a non-uniformity in the way local election officials verify these ballots. As interest in expanding mail voting swells as a consequence of the novel coronavirus, protecting the rights of all voters to participate in electoral politics requires a characterization of the correlates of VBM ballot rejection with an eye toward considering how disparities in ballot rejection rates might be rectified.

Keywords: vote-by-mail, rejected ballots, Florida, COVID-19, election administration

INTRODUCTION

IN SPRING 2020, THE ONSET OF THE COVID-19 pandemic disrupted presidential primaries across the United States. By early April 2020, the die was cast: over a dozen states had rescheduled their prima-

ries, and other states, like Ohio, New Jersey, and Wisconsin, moved hastily, if unevenly and clumsily, to push voters to request and cast mail-in ballots.[1] Beyond the United States, municipal contests in France set for March 2020 were suspended on account of the coronavirus, and the London mayoral race, originally planned for May 7, 2020, has been postponed for a year.[2]

The timing of the next American presidential election, scheduled for November 2020, raises a

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[1]Alaska, Connecticut, Delaware, Georgia, Hawaii, Indiana, Kentucky, Louisiana, Maryland, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, West Virginia, and Wyoming all moved their presidential primary dates. See Corasaniti and Saul 2020.
[2]On French municipal elections, see "France Suspends Local Elections Because of COVID-19" (2020). On the London mayoral race, see Proctor 2020.

serious question: how can a national election be safely conducted in the shadow of a pandemic? One potential answer is to allow (and potentially encourage or even mandate) all eligible voters to cast mail-in ballots, thus minimizing the number of voters who appear in person at early voting polling places and on Election Day.[3] If as of November 2020 social distancing guidelines remain in place across the United States and if the turnout in the 2018 midterm elections is any guide, the upcoming 2020 American presidential contest is likely to see extremely high voter turnout.[4] In such a scenario, and with recent primaries as warnings, it is hard to imagine how, without at least a significant number of voters casting mail-in ballots, social distancing can be respected in the November election.[5]

As of the writing of this article, movement toward vote-by mail (VBM) voting in the shadow of the COVID-19 pandemic is not hypothetical. Recent elections in Maine, Nebraska, New York, Ohio, and Wisconsin saw surges in mail-in voting.[6] In Georgia, for example, approximately 53 percent of voters cast mail-in ballots, up from less than four percent in the 2016 primary election (Hood III and Haynes 2020). According to a recent analysis conducted by the *New York Times*, an estimated 76 percent of voters in the American states will be eligible—no excuse necessary—to vote a mail ballot, with some estimates pegging the total number of VBM ballots cast at nearly 80 million mail ballots, more than double that in the 2016 general election (Love, Stevens, and Gamio 2020).

Since the contested 2000 presidential election, the United States has witnessed vitriolic debates—in the public sphere, in the halls of Congress, state capitols, and in state and federal courts—with competing claims over ballot access, election integrity, and the potential normative trade-offs between these two ideals. The novel coronavirus is making matters worse, exacerbating the ongoing rancor surrounding electoral politics in the United States. In the already polarized arena of election rules (Hasen 2020), VBM has entered center stage (Thompson et al. 2020), presently supplanting heated debates over voter identification laws (e.g., Hicks et al. 2015), early voting (e.g., Walker, Herron, and Smith 2019), and voter list maintenance (e.g., Ansolabehere and Hersh 2014).

While the push for VBM voting in the United States has taken on greater urgency in light of the COVID-19 pandemic, this way of voting is not new (Mann 2014; Biggers and Hanmer 2015). Five states—Colorado, Hawaii, Oregon, Utah, and Washington—mail ballots to all registered voters, and several others—including California, Nebraska, and North Dakota—allow counties to opt-in to all-mail elections.[7]

As we review shortly, there is extensive scholarship on the consequences of allowing, encouraging, or even effectively mandating mail voting and whether this produces higher turnout or alters the composition of the electorate in a meaningful way. However, there is surprisingly sparse research on the hundreds of thousands of VBM ballots cast by voters every election that are *not counted*—such as the estimated 430,000 VBM ballots not tabulated in the United States in the 2018 general election, including more than 100,000 with mismatched or missing signatures on return envelopes.[8] And there is even less scholarly attention on whether certain types of voters are disproportionately likely to have their mail ballots not count (Alvarez, Hall, and Sinclair 2008; Shino and Suttmann-Lea 2020). This—the potential disenfranchisement that can unintentionally result from mail ballots not being counted by local election officials—is our focus.

With an eye on the upcoming 2020 general election, our focus is on VBM ballots cast—but not counted—in the perennial battleground state of Florida in the 2016 and 2018 general elections. Our study begins with an overview of existing research on voting by mail. We then discuss the literature on why some VBM ballots are more likely to

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[3] Registered voters suffering from COVID-19 during an election are a special case, and all individuals in this group could in principle be provided with mail-in ballots. This is what happened in South Korea during the country's 2020 National Assembly elections. See Jeong and Martin 2020.

[4] For data on record turnout in 2018, see McDonald 2018.

[5] On the potential for adding voting options that could facilitate social distancing, see Hulse 2020.

[6] In Maine, see Shepherd 2020; in Nevada, see Associated Press 2020; in Nebraska, see Schulte 2020; in New York, see Dovere 2020; in Ohio, see Marks 2020; in Wisconsin, see Scheck, Hing, and Hall 2020.

[7] See National Conference of State Legislatures 2020. In the case of Colorado, for example, this means that all registered voters are sent ballots by mail prior to an election. However, voters have the option of voting in-person at designated centers. See Colorado Secretary of State 2020.

[8] Figures from the U.S. Election Assistance Commission's *Election Administration and Voting Survey: 2018 Comprehensive Report* (2019). Data available at U.S. Election Assistance Commission 2020.

be rejected than others, arguing that individual voter characteristics as well as local election administrative discretion may result in some voters being more susceptible to having their VBM ballots not count. After reviewing the specifics of VBM voting in Florida, we provide some descriptives on VBM ballots not counted in the 2016 and 2018 general elections. We then present results of a selection model that considers the determinants of VBM ballot rejection. Our rationale for employing a selection model is that, when assessing rejection rates of VBM ballots in a state like Florida, one that permits voters to *choose* to vote by mail or in person, those who select to vote by mail may be different than those who do not. We conclude with thoughts about how patterns of cast but uncounted VBM ballots in Florida raise questions about unintended consequences embedded in mail voting and what sort of considerations might be needed in November 2020 if the COVID-19 pandemic continues to push the United States in the direction of increased VBM usage.[9]

VOTING IN THE UNITED STATES

Regular and free elections are the keystone of democratic politics. They are mechanisms that translate voter preferences into elected officials, who then make policies on behalf of constituents (e.g., Downs 1957; Miller and Stokes 1963; Bafumi and Herron 2010; Tausanovitch and Warshaw 2014). Voters participate in elections by casting ballots, and traditionally there are two ways in the United States that voters can do this: in person or via mail. In-person voting takes place on Election Day and, in some states, in the days or weeks prior to Election Day during a designated early voting period. Voting by mail, in contrast, does not require a voter to present him or herself at a local polling or early voting site designated by officials.

In-person voting versus voting by mail

When a voter casts a ballot in person, a local official has the opportunity to validate the individual's identity face-to-face, in real time. Even in states without formal voter identification requirements, an in-person voter must affirm his or her identity to an election official in order to commence the voting process. Once an in-person voter's identity is confirmed, either during an early voting period or

on Election Day, the voter is issued a regular ballot to fill out and then cast. There are differences across jurisdictions in ballot forms, paper or electronic, but the key point here is that a voter casting an in-person ballot does not have to reaffirm his or her identity after voting. Indeed, privacy and security of the vote are of utmost importance.

In contrast, rather than self-identifying oneself or providing a form of identification prior to voting a ballot in-person, voting by mail necessitates the disembodied verification of a voter's identity by a local election official *after* the voter has already cast his or her ballot. That is, a VBM voter is not present when his or her ballot is verified prior to tabulation. It is this very absence of voters when election officials are verifying and tabulating ballots that is an obvious advantage of mail voting during a pandemic.[10] The downside risk for VBM voters, though, is ballot rejection *after* having voted, something that does not happen for those casting ballots in person.[11]

Not being physically present when an election official validates a voter's VBM ballot alters the opportunities for the voter to establish his or her identity. If information on a VBM return envelope does not meet the criteria in a given state or jurisdiction, said ballot is at risk of rejection (Mann 2014).[12] From requesting and then receiving a ballot, to correctly filling it out, to placing the completed ballot in a secrecy envelope that is then inserted into an official return envelope, to filling out and signing a voter's certificate (or even having a witness sign) on the back of a return envelope, there are multiple ways a mail ballot may leak out of the "voting pipeline" (Stewart III 2010, 575).

Beyond statutory definitions of what constitutes an acceptable VBM ballot, the decentralized nature of election administration in the United States

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[9]We use the terms "rejected" and "not counted" interchangeably to describe vote-by-mail (VBM) ballots cast by a voter, received by a local elections official, but ultimately not counted. See footnote 25 for a discussion of these terms.

[10]Some states have a form of "absentee" voting whereby a voter, prior to Election Day, appears at a designated place, fills out a ballot, and submits it. In our parlance, this is early in-person voting, not mail ballot.

[11]In this article we do not address the subject of provisional ballots that are cast by in-person voters but validated at a later time (Merivaki and Smith 2019).

[12]Voters casting mail ballots in 19 states, including Florida, are permitted to "cure" any deficiencies with their return envelope, although the rules and timeline to do so differ considerably (see Weil et al. 2020).

means that potentially thousands of local election officials have the opportunity to exercise discretion when determining whether a signature on an VBM ballot envelope should be accepted or rejected. Local discretion in election administration is not limited to VBM voting of course, but this form of voting is uniquely vulnerable to administrative discretion because of the absence of a voter's presence in the VBM verification process.

Growth of VBM voting in the United States

Much of the attention to mail voting in the United States has focused on five states with all-mail voting systems whereby election officials mail ballots to all registered voters. VBM voting extends well beyond this handful of states, however. Nearly half the states (including Florida) allow some local elections to be conducted completely by mail, and two-thirds of states (again, including Florida) allow no-excuse voting by mail, meaning a voter does not need to provide a reason to request a VBM ballot (National Conference of State Legislatures 2020). Although about 20 states still require voters to provide an excuse when requesting a VBM ballot, according to the U.S. Election Assistance Commission, roughly a quarter of all ballots cast nationwide in the 2016 and 2018 general elections were via mail, well in excess of 31 million votes in both years (U.S. Election Assistance Commission 2017a, 2019).

WHO VOTES BY MAIL?

An important first step in any effort to understand the correlates of VBM ballot rejection is considering who is likely to request and vote a mail ballot in the first place. Some scholars find that allowing VBM voting leads to considerable turnout effects (Richey 2008; Southwell and Burchett 2000); others, though, find small and sometimes negative effects of VBM on turnout (Dubin and Kalsow 1996; Oliver 1996; Karp and Banducci 2000; Fitzgerald 2005; Kousser and Mullin 2007; Southwell 2009; Bergman and Yates 2011; Gronke and Miller 2012; Gerber, Huber, and Hill 2013; Burden et al. 2014; Barber and Holbein 2020; Thompson et al. 2020). To the extent that there is a consensus in the literature, it is that VBM has positive albeit modest turnout effects.

With regard to whether the use of mail ballots leads to a shift in composition of the electorate,

many studies of this subject are based on data gathered well before the widespread increase in voting by mail. Some have found that older, partisan, and white registered voters, as well as those who have cast mail ballots in previous elections, are more likely to vote by mail (Patterson and Caldeira 1985; Oliver 1996; Karp and Banducci 2001; Berinsky, Burns, and Traugott 2001; Hanmer and Traugott 2004; Kousser and Mullin 2007; Bergman and Yates 2011), although others have found evidence of greater heterogeneity in this matter (Barreto et al. 2006; Amos, Smith, and Ste Claire 2017). There are times at which party mobilization efforts can affect the methods with which voters cast their ballots (Michelson 2005; Herron and Smith 2012; Hassell 2017). However, the most recent and comprehensive studies of the political consequences of VBM voting find no evidence of overall partisan effects or effects of this form of voting on election outcomes (Barber and Holbein 2020; Thompson et al. 2020).

Besides age, partisanship, and race/ethnicity, some registered voters are more likely to vote by mail given their personal circumstances. Most obviously, members of the military (and their dependents) and those living overseas tend to be heavy users of VBM voting, not surprising given their limited voting options and federal laws protecting their ability to cast a VBM ballot (Smith 2009). In particular, the Uniformed and Overseas Civilian Absentee Voting Act (UOCAVA) of 1986 provides ballot protections for civilians overseas, members of the uniformed service in active duty, and their dependents. In addition, the Federal Voting Assistance Program works to administer protections for voters under UOCAVA.[13] In 2009, Congress passed the Military and Overseas Voter Empowerment Act that requires election offices to mail ballots to UOCAVA voters no later than 45 days before each federal election.[14] Deadlines for both requesting and submitting a mail ballot vary considerably across the states.[15]

Voting by mail may benefit registered voters who have disabilities. For registrants in need of assistance,

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[13]For details on this program, see the Federal Voting Assistance Program website at <https://www.fvap.gov> (last accessed April 14, 2020).

[14]Following federal law, Florida Statutes § 101.62(4)(b) mandates that each supervisor of election mail VBM ballots to voters who have requested a ballot within two business days of receiving the request.

[15]For VBM rules pertaining to military and overseas voters, see Federal Voter Assistance Program 2020.

Florida law requires that VBM ballots must be "fully accessible to all voters, including voters having a disability" to ensure that all voters may "cast a secret, independent, and verifiable vote-by-mail ballot without the assistance of another person."[16] As in other states, voting-eligible individuals with disabilities in Florida are given the option to fill out a declaration when registering, confirming that they would like assistance when voting (Tokaji 2004). The level of help one receives can range from marking one's ballot on an accessible machine to having someone assist in filling out a mail ballot, and Miller and Powell (2016) find that individuals with disabilities are more likely to vote by mail.

In many states, there is considerable variation with respect to the degree to which local election officials emphasize VBM voting. In Florida, for example, long-time Pinellas County supervisor of elections, Republican Deborah Clark, led the effort among county election officials to encourage voters to vote by mail, resulting in roughly 55 percent of all Pinellas ballots being cast by via mail in the 2018 general election. "We just started our outreach programs sooner than some of the other counties" said Clark (Romano 2016). In contrast, across the state on the Atlantic, slightly more than a quarter of all votes cast in Florida's Broward County in 2018 were via mail. Indeed, although the southeast Florida county has more than 50 percent more registered voters than Pinellas, nearly 50,000 more voters cast VBM ballots in Pinellas in the 2018 election.[17]

EXPLAINING VBM BALLOT REJECTION RATES

Having provided some context on voting in the United States and described literature on VBM ballot usage in the country, we turn to our subject of interest, VBM ballot rejection. The scholarly literature on this subject is sparse, and we offer two potential explanations for VBM ballot rejections. The first turns on voters themselves and the second on administrative discretion of local election officials.

Explanation 1: Voter characteristics

Individual voter characteristics may affect whether a VBM ballot is deemed invalid (Alvarez, Hall and Sinclair 2008; Shino and Suttmann-Lea 2020). Concerns begin with a voter's socio-demographic background and difficulties some individuals may have

in casting valid votes (Knack and Kropf 2003; Kimball and Foley 2009). Scholars have found that voting technology interacts with voter demographics, in some cases leading to racial minorities casting more "residual" (or uncounted) votes (Darcy and Schneider 1989; Herrnson, Hanmer, and Niemi 2012; Tomz and Houweling 2003; Buchler, Jarvis, and McNulty 2004; Herron and Sekhon 2005). Findings like these lead us to incorporate voter race/ethnicity and age in our analysis of VBM ballot rejection. In terms of partisan affiliations, voters registered with a major party, as opposed to those registered with a third party or without a party (in Florida, these registrants are known as NPAs—registrants with "No Party Affiliation"), may be less likely to have their VBM ballots not count, considering the guidance voters receive from parties during get-out-the-vote campaigns that urge supporters to request and cast mail ballots (Michelson 2005; Hassell 2017).

We have already noted the role that signatures play in VBM ballot rejection. Unlike static physiological characteristics (e.g., one's iris or fingerprints), behavioral characteristics (e.g., one's gait, voice, or handwriting), may "change with the passage of time, mood, age, and other factors" (Bibi, Naz, and Rehman 2020, 290). One's signature can be fluid throughout life (Hilton 1992). As such, some individuals may be more likely to have discrepancies between their current signatures and what is on file with local election offices, particularly young registrants, who are not yet accustomed to providing signatures for verification; older registrants, who may have declining fine-motor skills; and registrants in need of assistance when voting.[18] Forensic experiments have found a non-zero chance of "real" signatures being rejected for not matching and forged signatures being accepted as valid (Herbst and Liu 1977).

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[16]Florida law dealing with VBM accessibility issues is Title IX, Chapter 101, Section 101.662, "Accessibility of Vote-by-Mail Ballots," available at <http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&URL=0100-0199/0101/0101.html> (last accessed March 5, 2020).

[17]Looking beyond Florida, in California the embrace of VBM by county election administrators varies greatly. Since 2016, the state has allowed county election administrators to offer all-mail ballot elections; five counties chose to adopt the new system prior to the 2018 election, but others have resisted (see Kousser, McGhee, and Romero 2019).

[18]Advocates of VBM systems like Neal Kelley, a former president of the California Association of Clerks and Election Officials, does admit that there "are difficulties on occasion" with poor penmanship (see Moretti 2014).

Names are composed of letters, and we consider in our analysis whether individuals with longer or more syntactically complicated names are more likely to face signature match problems. By complicated, we mean a name with a suffix, apostrophe, or hyphen. In addition, the more features of a name, the more signature possibilities exist for it. People with hyphenated last names may choose to use their terminal names in casual circumstances (e.g., at restaurants) but may sign the entirety of their last names on more formal occasions. Therefore, having a hyphenated last names provides an opportunity for signature discrepancies. The same logic applies to middle names. When an individual has a middle name, he or she can be inconsistent in its use. Individuals without middle names cannot be inconsistent in this way.

Moreover, we assess whether voters who have recently updated their names with a local election office may have lower VBM ballot rejection rates. Voters who have updated their names will presumably also have signatures on file that are relatively current. Given that approximately 94 percent of women change their name after marriage (Gooding and Kreider 2010), this suggests that gender may be related to VBM ballot rejection.

Lastly, a voter's physical proximity from an election administration office may play a part in the likelihood that his or her returned VBM ballot will not count. This is particularly important in states that provide voters the opportunity to correct problems with return envelopes. In Florida, for example, a voter who returns a VBM ballot prior to the deadline is permitted to "cure" it if a problem is identified. As a result of litigation prior to both the 2014 and 2016 general elections, expanded opportunities for Florida voters to cure their rejected VBM ballot prior to Election Day were in place by the 2018 general election. However, given time considerations and communication limitations for voters who cast VBM ballots from beyond Florida's borders, members of the military, their dependents, and Florida registered voters residing overseas or out of state presumably have less of an opportunity to cure rejected mail ballots than do in-state voters.

Explanation 2: Administrative discretion

The second potential cause of a VBM ballot's rejection lies in the discretion of local election administrators. In most states, including Florida, responsibility for VBM ballot processing is in the hands of local election officials and their canvassing boards. Functioning as "street-level bureaucrats" (Kimball and Kropf 2006; Lipsky 2010), local elections officials have considerable leeway when evaluating the veracity of a signature on a VBM ballot return envelope. Some, as in Florida, are partisan elected officials. Given that both people and machines are not foolproof in identifying genuine signatures, this discretion may foment non-uniformity in the application of election laws. Imai and King (2004) describe considerable discretion in Florida's 2000 recount with respect to how the 67 local election officials both processed and validated overseas VBM ballots. Similarly, Merivaki and Smith (2016) find considerable variation in rejected provisional ballots across Florida counties in recent elections but no evidence that the partisanship of supervisors of elections (SOEs) in Florida affects the rejection rates of provisional ballots.

More generally, some states have fairly lax standards for VBM envelope design. This may exacerbate VBM ballot rejection rates in jurisdictions whose return envelopes have instructions that are less clear than those in others.[19] In Florida, relatedly, local election officials continue to retain considerable latitude under state law concerning how they are to notify voters if their VBM return envelope has problems.[20] In the 2018 general election, for instance, elections offices contacted voters who had problems with their VBM return envelopes' certificates over the phone, by e-mail, and even through Facebook; other offices simply mailed postal notices (Smith 2018). Indeed, a judicial order by Federal Judge Mark E. Walker prior to the 2016 general election called Florida's statute governing rejected VBM ballots "a crazy quilt of conflicting and diverging procedures" with the "canvassing boards across the state employing a litany of procedures when comparing signatures."[21]

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[19]For examples of the wide range of designs for VBM return envelopes in Florida, see Conte 2017.

[20]For details, see footnote 26.

[21]Per Judge Walker: "What [Florida] vote-by-mail voters likely do not know, however, is that their vote may not be counted. In Florida, if a voter's signature on a vote-by-mail ballot does not match the signature on file with the supervisor of elections office then the ballot is declared 'illegal' and their vote is not counted. Moreover, that voter only receives notice that their vote was not counted after the election has come and gone and, further, is provided no opportunity to cure that defect. On the other hand, if a vote-by-mail voter doesn't bother to sign the ballot in the first place, that voter is immediately notified and provided an opportunity to cure." Judge Walker's order appears in *Florida Democratic Party v. Detzner* (2016).

Discretion of local election officials or county canvassing boards may result in unequal treatment of VBM ballots due to implicit biases or partisanship, allowing racial or party preferences to be subconsciously present (Greenwald and Banaji 1995; Eberhardt 2019). There is ample evidence of such bias in other administrative realms: Black individuals face less favorable mortgage terms regardless of credit (Ross and Yinger 1999) and are less likely to receive job callbacks than white individuals (Pager, Bonikowski, and Western 2009). Elected officials, too, may harbor implicit biases towards minorities. White, Nathan, and Faller (2015) show that local election officials are less likely to respond to e-mails from Hispanics requesting information on the voting process than they are to respond to non-Hispanic white individuals. Similarly, Butler and Broockman (2011) show that when asked to assist an individual to register to vote that state legislators are less responsive to e-mail requests from putative Black individuals relative to white individuals, even when holding constant the partisanship of the individual requesting the information. In addition, some studies suggest that a public officials' partisanship may shape their bias. Kimball, Kropf, and Battles (2006) find that in the 2004 general election, more provisional ballots were cast and counted in jurisdictions in which the local election official belonged to the same party as the majority of voters.

VOTING BY MAIL IN FLORIDA

We use Florida as a laboratory for our study of VBM ballot rejection, and our rationale is as follows. What is presently being debated in the United States is the possibility of increasing or facilitating VBM opportunities for voters in the 2020 general election. Florida allows VBM (no excuse required, as noted earlier), early in-person voting, and Election Day voting. Because voters in Florida can choose from a variety of ways to vote, the state is a useful benchmark for one, say, that is considering transitioning from a limited VBM policy to a more generous one. On account of the ongoing pandemic, there is already some movement in this direction in the United States. New Hampshire, for example, traditionally allows mail-in voting but only if an acceptable reason ("excuse") is provided. This requirement has been effectively lifted during the ongoing pandemic (Gardner and MacDonald 2020).

In Texas, however, where voting by mail is more restricted than in Florida, as of the writing of this article no decision has been made by state officials to expand mail-voting opportunities.[22] While states that have fully embraced all-mail voting systems might constitute a useful benchmark for jurisdictions considering effectively eliminating in-person voting in November 2020, the administration of all-mail voting states tends to be rather centralized (see U.S. Election Assistance Commission 2017b). All-mail voting states are not necessarily comparable to the more decentralized election administration apparatuses in states like Florida.

For more than a decade, Floridians have utilized, in nearly equal shares, three methods of casting a ballot: VBM, early in-person, and Election Day. Since the adoption of no-excuse mail voting in the Sunshine State in 2001, the popularity of voting by mail has grown steadily. In the 2008 general election, 21.9 percent of all ballots cast were by mail; by the the 2018 general election, this figure had risen to 31.6 percent, the highest share of any of the last six elections.[23]

Beyond the fact that it offers multiple modes of voting, Florida is a useful location for a study of VBM usage given its large and diverse racial and ethnic population. Florida is also a regular political battleground, implying that voters in the state have real incentives to ensure that their votes count, incentives that may not exist in a state in which elections are more of a formality. Florida also features an election system in which both state and local election officials have control, what the U.S. Election Assistance Commission characterizes as a "hybrid" election system (U.S. Election Assistance Commission 2017b).

Elections are administered in Florida at the county level by county supervisors of elections, all 67 of whom are elected officials except for

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[22]In Texas, those wanting to vote a mail ballot must be at least 65 years old, absent their county of residence on Election Day or during the early in-person voting period, sick or disabled in a way that prevents in-person voting, or incarcerated (see Hurley 2020).

[23]In 2018, slightly less than one-third (32.8 percent) of all ballots cast were in-person early votes, with another 35.7 percent cast by voters in-person on Election Day. Over the past six general elections, from the 2008 presidential through the 2018 general election, Floridians have cast nearly 46.4 million ballots, 27.4 percent of them VBM, 30.3 percent early in-person, and 42.3 percent on Election Day. See Florida Division of Elections 2018a. Calculations by the authors.

Miami-Dade's, who is appointed by the Mayor of Miami-Dade. Florida SOEs must follow state statutes as well as rules adopted by the Florida Division of Elections.[24] Florida law sets a uniform standard of review for the validation of signatures on returned mail ballots by elections officials.[25] Despite reforms that allow voters to cure problematic VBM ballots, the rejection rate of VBM ballots in Florida elections has remained relatively constant over time.[26] In the two most recent presidential elections, roughly 1.0 percent of VBM ballots did not count, a slightly lower rejection rate than in the two most recent midterm elections.

The initial decision regarding the acceptance or rejection of a VBM ballot is made by clerks in a county's SOE office, in principle upon receiving said ballot. Final decisions about ballot rejection, however, are made by county-level canvassing boards made up of three elected officials, typically the county SOE, a county court judge, and the chair of the Board of County Commissioners. County canvassing boards meet publicly both before and after Election Day. According to Florida Statutes, "The canvassing board must, if the supervisor has not already done so, compare the signature of the elector on the voter's certificate … to see that the elector is duly registered in the county and to determine the legality of that vote-by-mail ballot."[27] A VBM ballot is to be initially rejected by a local elections official if a voter did not sign the voter's certificate on the back of her absentee ballot envelope or if the voter did sign the certificate but in a way that did not match the voter's signature on file with the county SOE. Making their decisions by majority vote, if a canvassing board decides that the signature on a voter's certificate does not match a signature on file, the ballot will not be opened or counted and instead will be marked with the phrase, "rejected as illegal."[28]

In Florida, notwithstanding opportunities for voters to cure missing or mismatched signatures, tens of thousands of on-time VBM ballots are still rejected every election. In the 2018 general election, for example, more than 1/100 VBM ballots received by local election officials were ultimately not counted, amounting to some 31,969 uncounted ballots.[29] To put this figure in context, there were two very close contests in Florida in the 2018 general election, including the United States Senate race (final vote margin, 10,033 votes) and the Florida gubernatorial race (32,463 votes).[30] We are not

[24]There are always exceptions to local supervisors of elections (SOEs) complying with state directives. For an example from the 2018 general election, see Atterbury and Caputo 2018.

[25]Florida law dealing with the review of signatures on VBM return envelopes is Title IX, Chapter 101, 101.6103, "Mail Ballot Election Procedure," available at <http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&URL=0100-0199/0101/0101.html> (last accessed March 5, 2020). Specifically, a VBM ballot "shall be counted only if: (a) It is returned in the return mailing envelope; (b) The elector's signature has been verified as provided in this subsection; and (c) It is received by the supervisor of elections not later than 7 p.m. on the day of the election. The supervisor of elections shall verify the signature of each elector on the return mailing envelope with the signature on the elector's registration records. Such verification may commence at any time prior to the canvass of votes."

[26]In 2019, Florida changed the law to allow voters up to two days after Election Day to "cure" their problematic VBM ballot. Florida law dealing with the affidavit cure process of rejected VBM ballots is available at <http://www.leg.state.fl.us/statutes/index.cfm.html>, Title IX, Chapter 101, Section 101.68 "Canvassing of Vote-by-Mail Ballot" (last accessed March 5, 2020).

[27]Florida law dealing with the rejection of VBM ballots is available at <http://www.leg.state.fl.us/statutes/index.cfm.html>, Title IX, Chapter 101, Section 101.68 "Canvassing of Vote-by-Mail Ballot" (last accessed March 5, 2020).

[28]When supervisors of elections upload the individual-level vote histories in an election to the Florida Division of Elections, rejected ballots are recorded with a "B" for a "Vote-by-Mail Ballot Not Counted" (see Florida Division of Elections 2018b). We note here that some variation exists across the state's 67 counties in how SOEs report to the state Division of Elections VBM ballots that their canvassing board determines should not counted. After tabulating their rejected VBM ballots, a few counties, including Alachua, Bay, and Escambia, as well as Orange County (in 2016, but not in 2018), include in their uploads to the state VBM ballots that were not counted because they arrived after the state's 7:00 p.m. Election Day deadline. Most other counties, however, exclude late ballots in their vote history uploads, limiting their uploads only to on-time VBM ballots that their canvassing boards "rejected as illegal." As such, it is possible that these few counties may have slightly inflated rates of VBM ballots that are not counted because they include rejected ballots that arrived after Election Day in the official statewide voter history files. We find no evidence that the inclusion of these relatively few late ballots might affect the estimation outcomes, and there is no evidence that the demographic characteristics of these four very different counties might affect the outcome.

[29]We discuss our methodology for calculating uncounted VBM ballots in the sections that follow. According to the U.S. Election Assistance Commission's Election Administration and Voting Survey (EAVS) Dataset Version 1.2 (released February 18, 2020), which is available at <https://www.eac.gov/research-and-data/datasets-codebooks-and-surveys> (last accessed April 2, 2020), variable C4a "By-Mail Ballot Rejected: Total" indicates that there were 30,452 rejected mail ballots tabulated in Florida in the 2018 general election.

[30]See Florida Division of Elections archive, available at <https://results.elections.myflorida.com/Index.asp?ElectionDate=11/6/2018&DATAMODE=> (last accessed March 26, 2020).

suggesting that rejected VBM ballots were pivotal to either of these contests, but in principle they could have been in the former considering the number of rejected VBM ballots was greater than the final Senate race margin. Our point here is that counts of rejected VBM ballots should not be considered rounding errors.

DATA AND VARIABLE DEFINITIONS

Our analysis of rejected VBM ballots in the 2016 and 2018 general elections in Florida relies on individual-level administrative data on registered voters and their vote histories; these are public records in Florida. A voter whose absentee ballot was received but not counted in any given election receives an identifying mark (a voting code) in the state's official registered voter database. We draw on statewide databases provided by the Florida Division of Elections dated January 2017 and January 2019. Each consists of a *details* file for each of Florida's 67 counties as well as a *history* file. The former contains registrant demographics (name, address, date of birth, date of registration, race/ethnicity, gender, and so forth) and the latter, information indicating whether in a given election a voter cast an absentee ballot that was accepted as valid, cast an absentee ballot that was not counted, voted on Election Day or early in-person, or cast a provisional ballot that was rejected.

In contrast with many other states, Florida's voting records are extensive and available for public scrutiny. Each Florida county's details and history files are linked by a nine-digit voter identification number. We calculate the VBM ballot rejection rate as the number of individuals casting a VBM ballot that did not count divided by the number of total VBM ballots cast according to a statewide vote history file.[31] When merged using voter identification codes, the 67 county files contain records on 9,530,929 individuals who participated in Florida's 2016 general election and 8,255,083 individuals who participated in Florida's 2018 general election.

Incorporating Florida's Legislative Report Election/Recap for the 2016 and 2018 general elections, we create indicator variables specifying whether a registered voter is a member of the military, a military dependent, needs voting assistance,

and has formerly changed his or her name based on the categorical information available from the voter file. We collapse demographic data, such as age (transformed from birth date on the voter file), party affiliation, race/ethnicity, and gender, into nominal variables. We code a registrant's party affiliation as Democrat, Republican, NPA, and collapse all registered voters with a third party as "Other." In keeping with the official classifications on Florida's voter registration form, we code a registrant's race/ethnicity as white, Black, or Hispanic, collapsing all other entries as "other." We rely on a registrant's stated gender ("M" or "F"), coding those with no code as "other."[32] In some of our analyses, we collapse a voter's age on the day of the November 6, 2018 general election and the November 8, 2016 general election into a nominal variable with age ranges of 18–21, 22–25, 26–29, 30–44, 45–64, and 65–100.

We also for each election create binary variables for registered voters having a foreign mailing address and for those having a domestic mailing address not in Florida. Lastly, we construct variables to capture information about registered voters' names, such as the number of characters in the first and last names combined (we create indicator variables for name lengths from four characters or fewer to 25 or more), and the presence of a hyphen, suffix, or apostrophe. Lastly, we create a flag for voters with a middle initial and another flag for voters with middle names. See the Appendix for data

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[31]The January 2017 and January 2019 statewide vote history files contain small numbers of discrepancies. For example, in the 2019 files there are 695 individuals who are recorded as having multiple, and at times differing, vote history codes in the 2018 general election. For these individuals, we drop all history codes but one, retaining whichever vote occurred first chronologically or the vote history that was counted as valid if another one is coded as either a rejected provisional ballot (cast on Election Day or early in-person) or as a rejected VBM ballot. For example, if per official vote history file a voter is said to have cast ballots both early in-person and at the polls on Election Day, we retain the code for the early in-person vote. If a voter cast a rejected provisional ballot on Election Day but cast a VBM ballot that was valid, we retain the vote history code for the valid VBM ballot.

[32]In many states, gender is not a required field on voter registration applications. Florida's form provides applicants the option of volunteering either "M" or "F." Florida's statewide registration database includes this information, and it classifies those who chose not fill in the information as "U" for unknown (Shino et al. 2020).

definitions along with counts of individuals in our data who have missing or erroneous data.[33]

OVERVIEW OF REJECTED
VBM BALLOTS IN FLORIDA

Of the more than 2.7 million VBM ballots cast in November 2016, over 27,700 were not counted, corresponding to a rejection rate of approximately 1.0 percent. And, of the more than 2.6 million VBM ballots cast in November 2018, nearly 32,000 were invalid, a rejection rate of approximately 1.2 percent.[34]

Rejected VBM ballots by age

Younger voters were disproportionately more likely to have their VBM ballots rejected in both the 2016 and 2018 general elections, as Table 1 displays. The rejection rate of VBM ballots cast by 18–21 year-olds was 3.9 and 5.4 percent in 2016 and 2018, respectively, eight times greater than that of the oldest cohort in both years. Although 18–29 year-olds comprised only 2.7 percent of all voters casting VBM ballots in the 2016 presidential election, they accounted for over 11 percent of all rejected VBM ballots; in 2018, those under 30 comprised just 2.1 percent of all VBM voters but 9.2 percent of all rejected VBM ballots. First-time VBM voters also were more likely to have their mail ballots rejected. In 2018, of the roughly 33,000 voters who cast a VBM ballot for the first time (which we determine using the statewide vote

TABLE 1. VOTE-BY-MAIL BALLOTS BY AGE

Age	VBM total	VBM not counted	VBM accepted	Percent not counted
2016 general election				
18–21	74,234	2,928	71,306	3.94
22–25	85,421	2,883	82,538	3.38
26–29	91,570	2,460	89,110	2.69
30–44	366,955	6,121	360,834	1.67
45–64	892,894	6,638	886,256	0.74
65–100	1,224,911	5,390	1,219,521	0.44
Total	2,735,985	26,420	2,709,565	0.97
2018 general election				
18–21	55,252	2,977	52,275	5.39
22–25	65,583	2,704	62,879	4.12
26–29	72,013	2,449	69,564	3.40
30–44	316,023	6,662	309,361	2.11
45–64	850,952	9,162	841,790	1.08
65–100	1,276,673	8,015	1,268,658	0.63
Total	2,636,496	31,969	2,604,527	1.21

VBM, vote-by-mail.

history file), 4,137 had their ballots rejected, or 3.1 percent. First-time voters accounted for almost 5.0 percent of VBM ballots cast in 2018 but 12.7 percent of rejected VBM ballots.

Figure 1 plots the VBM ballot rejection rates of those under 30 and those 30 years old and older in the 2018 general election (a corresponding figure from the 2016 general election is similar). Along the horizontal axis is the rejection rate of VBM ballots (from zero to 12.5 percent) cast by voters 30 and older in each county; the vertical axis is the rejection rate of VBM ballots cast by voters younger than 30 years old. If VBM ballot rejection rates were equal for voters under 30 and those 30 years old and older in a county, the circles of all 67 counties would align along the 45-degree line.

As Figure 1 shows, younger voters in the 2018 general election in nearly every Florida county had a greater likelihood of having their VBM ballot rejected than those 30 and older who cast a VBM ballot. In several counties, the VBM rejection rate of young voters is more than three times as great compared to the VBM rejection rate of older voters. For example, in Broward County, roughly seven percent of mail ballots cast by voters under 30 were rejected in 2018, compared to less than 2.5


[33]The subject of voter file availability across the United States is beyond our scope, but we note that there is variability in both the extent to which states make public their voter files and the extent to which these files contain demographic information on registered voters. Florida not only makes its voter file public, but this file contains registered voters' self-reported date of birth, race and ethnicity, and partisan affiliation. In contrast, Wisconsin, a state that is prominent vis-à-vis VBM voting in light of its 2020 presidential primary, allows access to its voter file (at a cost for the complete file of $12,500), but this file lacks fields for a registered voter's age, race and ethnicity, or partisan affiliation. See Wisconsin Election Commission 2020. As such, data availability is another reason that Florida provides an excellent laboratory for studying VBM voting.

[34]Florida's official vote total in the 2016 general election is 9,580,489, and is available from the Florida Division of Elections archive at <https://results.elections.myflorida.com/Index.asp?ElectionDate=11/8/2016&DATAMODE=>. The state's official VBM total in the 2016 general election is 2,732,075 votes, and is available at <https://dos.myflorida.com/media/697363/early-voting-and-vote-by-mail-report-2016-gen.pdf>. Florida's official vote total in the 2018 general election is 8,305,929, and is available from the Florida Division of Elections archive at <https://results.elections.myflorida.com/Index.asp?ElectionDate=11/6/2018&DATAMODE=>. The state's official VBM total in the 2018 general election is 2,623,798 votes, and is available at <https://dos.myflorida.com/media/700669/early-voting-and-vote-by-mail-report-2018-genpdf.pdf>. Florida's official total VBM votes cast in both elections exclude uncounted VBM ballots.
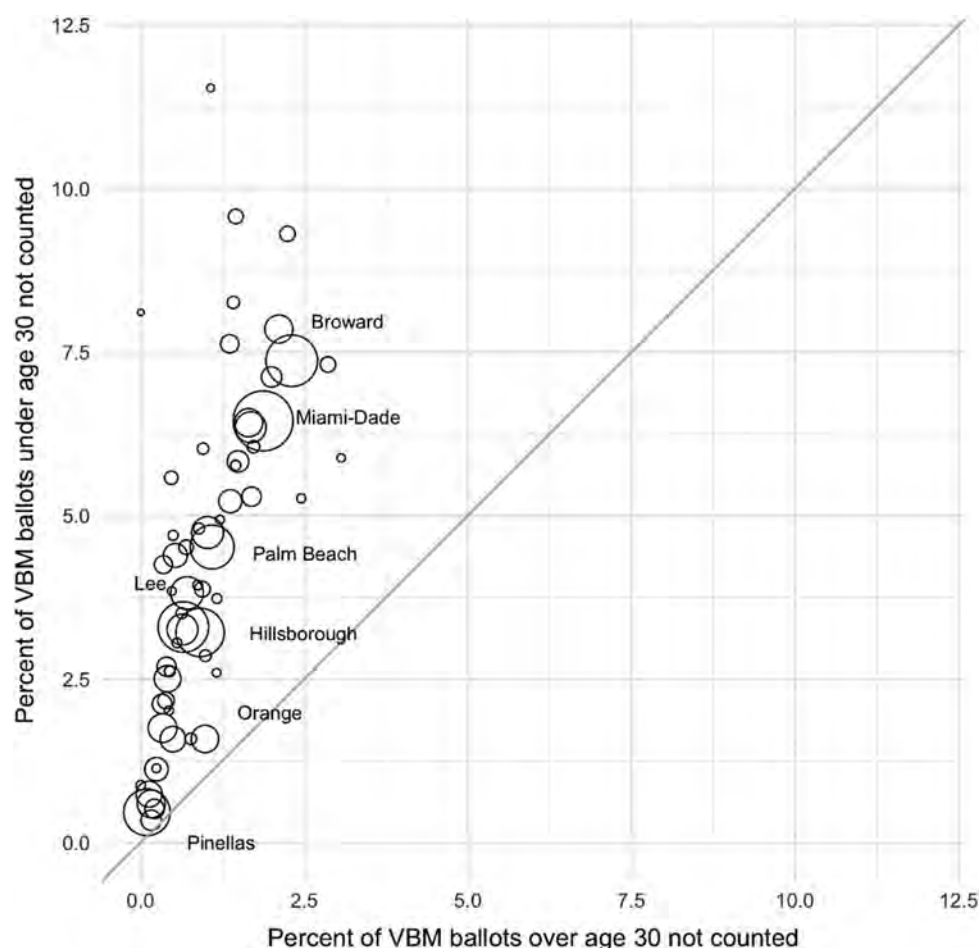
FIG. 1.   Percentage of vote-by-mail (VBM) ballots not counted, by age, 2018 general election. *Note:* This figure excludes the seven counties with no rejected VBM ballots cast by voters under 30. Point size is proportional to total rejected VBM ballots cast by voters under 30. Counties are labeled if there were over 90,000 VBM ballots cast in the 2018 general election.

percent of VBM ballots cast by voters 30 and over. The disparity is even higher in Lafayette, Monroe, Santa Rosa, Volusia, and Walton counties.

Rejected VBM ballots by race and ethnicity

Beyond age, there were differential patterns of uncounted VBM ballots across racial and ethnic groups in the 2016 and 2018 general elections. As Table 2 shows, 0.65 percent of VBM ballots cast by white voters in the 2016 election were not counted by county canvassing boards, compared to 1.86 percent for Black voters, 1.69 percent for Hispanic voters, and 1.77 percent for VBM voters in other racial and ethnic groups. In the 2018 general election, nearly 240,000 Black voters voted by mail, accounting for roughly 9.0 percent of all VBM ballots cast, but they accounted for 14.5 per-

TABLE 2.   VOTE-BY-MAIL BALLOTS BY RACE AND ETHNICITY

Race/ethnicity	VBM total	VBM not counted	VBM accepted	Percent not counted
2016 general election				
White	1,961,339	12,781	1,948,558	0.65
Hispanic	381,144	6,458	374,686	1.69
Black	244,348	4,534	239,814	1.86
Other	149,154	2,647	146,507	1.77
Total	2,735,985	26,420	2,709,565	0.97
2018 general election				
White	1,898,004	17,039	1,880,965	0.90
Hispanic	353,839	7,241	346,598	2.05
Black	238,200	4,675	233,525	1.96
Other	146,453	3,014	143,439	2.06
Total	2,636,496	31,969	2,604,527	1.21

cent of all the VBM ballots that were uncounted by county canvassing boards. Even more dramatically, even though the 356,000 Hispanics who cast absentee ballots in the election comprised 13.4 percent of all VBM ballots cast statewide, Hispanic voters accounted for 22.6 percent of all rejected VBM ballots.

Figure 2a and Figure 2b display by county the percentage of rejected VBM ballots cast by Black and Hispanic voters, respectively, compared to the percentage of rejected VBM ballots cast by white voters.[35] In both plots, the horizontal axis is the rejection rate of VBM ballots (from zero percent to five percent) cast by white voters. Along the vertical axis (also zero to five percent) is the rejection rate of VBM ballots cast by Black voters (Figure 2a) or Hispanic voters (Figure 2b) in each county. If VBM ballot rejection rates were the same for white and Black (or Hispanic) voters, points in these two figures would fall along diagonal 45-degree lines. It is clear, however, that nearly every county in Florida falls above the 45-degree line, highlighting how VBM rates for minorities exceed those of white voters.

Rejected VBM ballots by uniformed and overseas civilians

Given the various protections in place for overseas and uniformed personnel under UOCAVA, it is perhaps surprising that VBM ballots returned by these voters are rejected at a rate higher than for voters in Florida overall. Table 3 reveals that 2.7 percent of VBM ballots cast by UOCAVA voters in the 2016 general election were not counted by local canvassing boards. Among UOCAVA voters, domestic military voters had the highest rejection rate in the presidential election, at 3.2 percent. In the 2018 general election, the overall rejection rate was even higher for UOCAVA voters than in the 2016 presidential election: 3.6 percent of VBM ballots cast by military and overseas voters—those covered under UOCAVA—were not counted by SOEs. Civilian and military overseas voters had roughly 2.3 percent of their mail ballots rejected in the election. As in 2016, though, domestic military voters had the highest rate of rejection of VBM ballots among UOCAVA voters. As Table 3 shows, at 4.3 percent, the rejection rate in the 2018 general election for mail ballots cast by domestic military voters was higher than any rejection rate broken down by race or ethnicity that year.

Rejected VBM ballots by county

We now turn to the geographic variability of VBM ballot rejection rates. There is significant variance in these rates across Florida's 67 counties, particularly in the 2018 general election, suggesting that there might be some discretion by local officials when it comes to either the design of VBM return envelopes or the practices used by staff to validate or reject VBM ballots.

Figure 3 displays the percentage of rejected VBMs in the 2016 and 2018 general elections across counties. This figure has 67 points, one per county, and each point is sized based on the total number of VBM ballots cast in the county in the 2016 and 2018 elections. The horizontal location of a point in Figure 3 depicts a county's VBM rejection rate in the 2016 general election and the vertical location, the county's VBM rejection rate in the 2018 general election. The figure has a 45-degree line, and counties very close to this line had approximately equal 2016 and 2018 VBM rejection rates.

One key feature of Figure 3 is that the majority of Florida counties had greater VBM rejection rates in the 2018 general election than in the 2016 election. This is evident in the fact that most points in the figure lie above the figure's 45-degree line.

A second key feature of Figure 3 is that, simply, there was across-county variance in VBM rejection rates in 2016 and 2018.[36] In 2018, for example, some counties had rejections rates of literally zero (Baker, Hamilton, and Jefferson); a few counties

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[35]Figure 2a excludes two counties due to their small sample sizes, Lafayette and Gilchrist. Gilchrist rejected two of 16 VBM cast by Black voters, and Lafayette one of five. Figure 2b excludes one county, Calhoun, which rejected one of nine VBM ballots cast by Hispanic voters.

[36]Technical reasons may help to explain some of these disparities. For example, in several of the state's larger counties, including Broward, Collier, Duval, Hillsborough, Miami-Dade, Orange, Palm Beach, and Pinellas, election offices rely on Pitney Bowes (now known as BlueCrest) machines to process mail ballots and verify voters' signatures. (Personal email correspondence from Collier County Supervisor of Elections, April 14, 2020, available from the authors). Received VBM ballots in these counties are initially processed through a machine that automatically reviews a signature on the return envelope, matching it to the voter's signature on file; if the signature is missing or mismatched, it goes before the canvassing board for review. In smaller counties, SOE staff members manually process signatures on return envelopes, forwarding those with problematic signatures to a canvassing board for review.
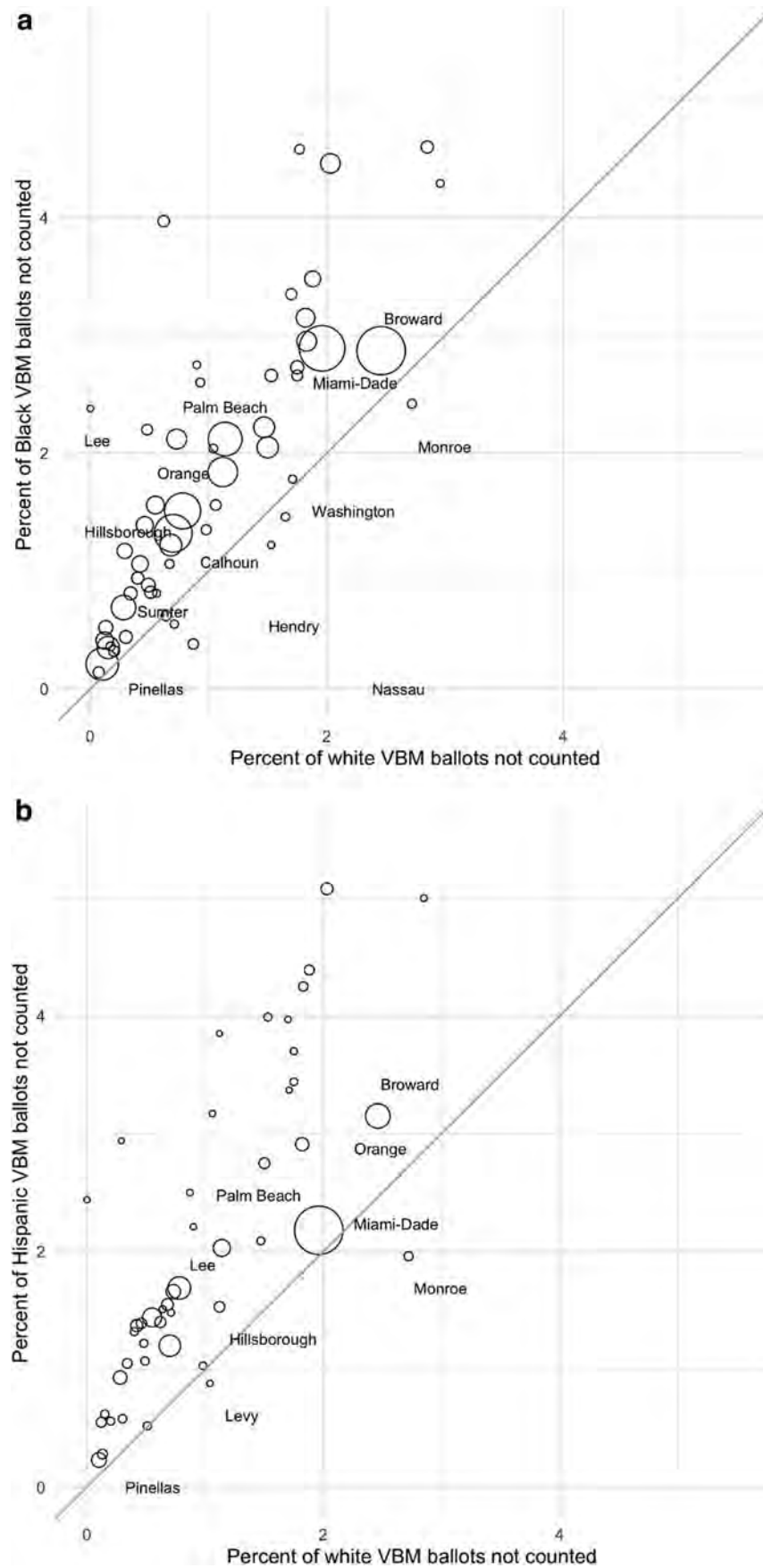
FIG. 2. Percentage of rejected vote-by-mail (VBM) ballots, by race and ethnicity, 2018 general election. **(a)** White vs. Black; **(b)** White vs. Hispanic.

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TABLE 3. VOTE-BY-MAIL BALLOTS BY UOCAVA

Group	VBM total	VBM not counted	VBM accepted	Percent not counted
2016 general election				
Civilian overseas	26,894	526	26,368	1.96
Domestic military	56,897	1,818	55,079	3.20
Military overseas	7,714	124	7,590	1.61
Military or overseas	89,037	2,468	91,505	2.70
2018 general election				
Civilian overseas	17,774	412	17,362	2.32
Domestic military	36,438	1,572	34,866	4.31
Military overseas	3,593	84	3,509	2.34
Military or overseas	55,737	2,068	57,805	3.58

UOCAVA, Uniformed and Overseas Civilian Absentee Voting Act.

(i.e., Bay and Gulf) rejected more than three percent of their VBM ballots, and nine counties. (Alachua, Bay, Broward, Miami-Dade, Gulf, Madison, Marion, Seminole, and Volusia) had rejection rates of greater than two percent. There is greater vertical dispersion in Figure 3 than there is horizontal dispersion, and this means that county VBM rejection rates varied more in 2018 than in 2016. As we noted previously, Orange County is an outlier in Figure 3; its rate of VBM ballots not counted in 2018 is only one-third as high as in 2016. This is due to the administrative decision of the Orange County SOE, following the 2016 general election, to alter how it reported to the state Division of Elections the number of VBM ballots that arrived after Election Day. In 2016, the county reported these as rejected VBM ballots, and as such they were included with the county's on-time ballots that were not counted. In 2018, the county altered its practice and did not report late-arriving ballots to the Division of Elections as not counted; they simply did not report them, thus deflating the county's numerator regarding the rate of rejected VBM ballots.[37]

It is possible, of course, that voters in some Florida counties have different abilities in the matter of properly voting a VBM ballot than those in in other counties. That is, the county-wide VBM ballot rejection rates in Figure 3 may be confounded by non-uniform distributions of age groups, UOCAVA voters, and racial and ethnic minorities across Florida. Still, if equal standards are being applied by SOEs and their staffs, VBM rejection rates conditional on demographic groups should not differ substantially across counties, and Figure 3 raises questions about county discretion.

Figure 4 provides an alternative perspective on county variability, displaying the geographic distribution of VBM rejection rates across Florida in both elections. The darker the shade of a county, the greater its VBM rejection rate. Two geographic features stand out. First, the southern tip of Florida is relatively darkly shaded for both elections. This area of the state, home to the populous Miami-Dade, Broward, and Palm Beach counties, had relatively high rejection rates, particularly in the 2018 general election. Second, Figure 4 shows that there is heterogeneity across Florida in VBM rejection rates in both elections. There is no geographical area in Florida that is immune to VBM ballot rejection. The ravishing effects of Category 5 Hurricane Michael, which struck Bay and Gulf counties in the state's Panhandle less than a month prior to Election Day in 2018, are also clearly visible (Zelin and Smith 2020; Morris and Miller 2020).

MODELING VBM BALLOTS CAST AND REJECTED

Our descriptive findings, above, about VBM ballot rejection in the 2016 and 2018 general elections are potentially confounded in the following two ways. First, different types of registered voters in Florida may sort themselves into counties, and this could manifest itself in variability across Florida in VBM rejection rates that looks like county discretion but is actually voter sorting. Second, registered voters who choose to cast absentee ballots may be systematically different from registered voters who cast in-person ballots, either early or on Election Day. Perhaps the most obvious reflection of this consists of registered voters living overseas and those in the military and their dependents, i.e., UOCAVA voters. Thus, what appear to be, say, age-effects in VBM rejection rates in Florida may in part reflect variability in the extent to which young voters cast VBM ballots in the first place.

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[37]Following the 2016 general election, Orange County changed the coding of how it reports late VBM ballots to the state, after it was criticized in a report for ACLU FL (see Lemongello 2018).
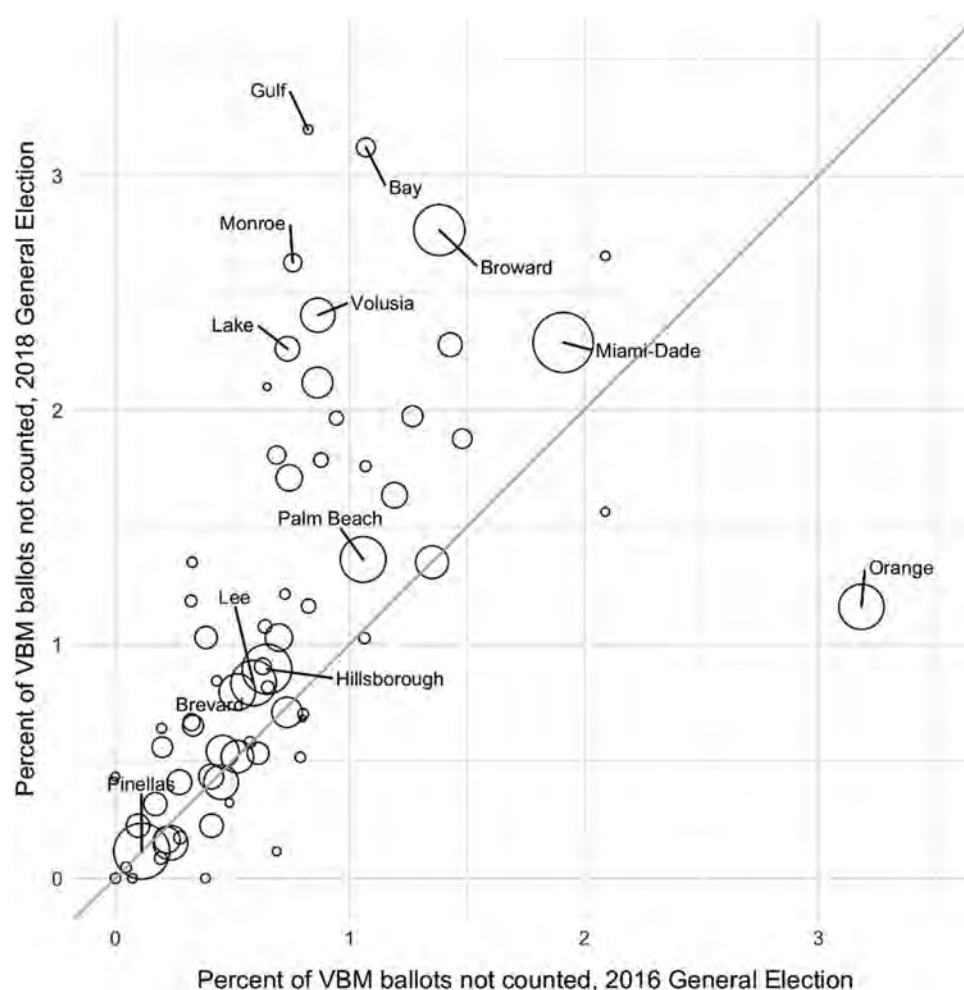
FIG. 3.   Percentage of vote-by-mail (VBM) ballots not counted, by county, 2016 vs. 2018 general elections.

*Selection into vote-by-mail and possible
VBM ballot rejection*

To address these concerns, we estimate a selection model for both elections to account for the choice that Florida voters face when deciding to cast an in-person or a VBM ballot in an election (Heckman 1977). Our model incorporates two steps: first, a selection step in which voters decide whether to cast an absentee ballot or to vote in person (on Election Day, early in-person, or provisionally), and second, a reject-or-not step in which a voter's mail ballot is potentially rejected.

The predictors in our model's selection step (VBM vote or not) and rejection step (rejected ballot or not) consist of variables that we discussed earlier in our data section. They include voter-level characteristics on race/ethnicity, party, gender, age,

type (military or not, needs assistance or not, and so forth), and name features (length, presence of a hyphen, and so forth). Our use of these variables follows from the literature we have reviewed as well as considerations about voter features like their names. Our model includes county fixed effects, and we cluster standard errors by county.

To identify our selection model, we must identify predictors, known as exclusion restrictions, that affect selection into VBM voting but not VBM ballot rejection. We use the congressional, Florida state senate, and Florida state house districts in which a voter resides as our exclusion restrictions. Theoretically, we expect that campaigns may affect the rates of VBM use across these types of districts, given that campaigns concentrate different levels of effort into encouraging voters to vote by mail (Leighley 2001; Michelson 2005; Hassell 2017). We have
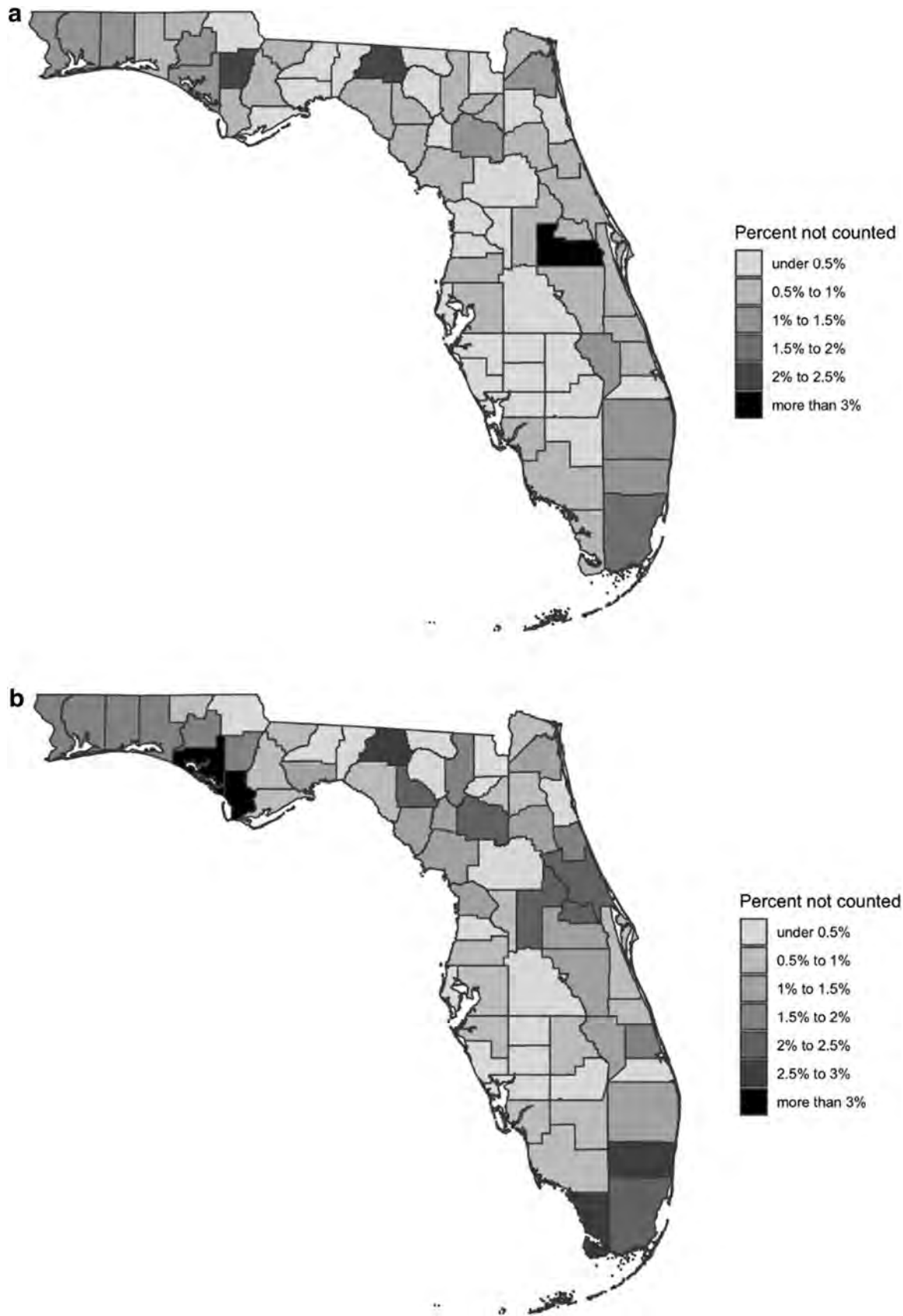
FIG. 4.   Maps of vote-by-mail (VBM) rejection percentage, by county. **(a)** 2016 general election; **(b)** 2018 general election.

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no reason to believe that a registered voter's congressional or state legislative district should affect the likelihood of his or her VBM ballot being rejected; Florida election administration is conducted at the county level, as we have already reviewed.[38]

TABLE 4. SELECTION MODEL ESTIMATES FOR VOTE-BY-MAIL BALLOTS CAST AND REJECTED, ABRIDGED

	2016 general election		2018 general election	
	Voted VBM	Rejected VBM	Voted VBM	Rejected VBM
Party: Democratic	0.084***	-0.10***	0.10***	-0.089***
	(0.010)	(0.017)	(0.015)	(0.021)
Party: Third	0.0067	-0.046*	-0.032***	0.0010
	(0.0081)	(0.023)	(0.008)	(0.030)
Party: Republican	0.019*	-0.11***	-0.0039	-0.11***
	(0.0078)	(0.012)	(0.0072)	(0.010)
Race: Black	-0.21***	0.27***	-0.25***	0.10*
	(0.017)	(0.023)	(0.014)	(0.048)
Race: Hispanic	-0.077*	0.093**	-0.027	0.083**
	(0.033)	(0.030)	(0.032)	(0.029)
Race: Other	-0.020	0.13***	-0.0010	0.11***
	(0.012)	(0.014)	(0.011)	(0.018)
Gender: Male	-0.11***	0.086***	-0.10***	-0.0019
	(0.0035)	(0.015)	(0.0036)	(0.010)
Gender: Unknown	-0.12***	0.088***	-0.067***	0.016
	(0.021)	(0.017)	(0.011)	(0.015)
Military	0.45***	-0.087	0.32***	0.070
	(0.055)	(0.068)	(0.049)	(0.048)
Military dependent	0.33***	-0.025	0.25***	0.10*
	(0.037)	(0.049)	(0.032)	(0.049)
Overseas	1.52***	-0.31	1.27***	0.13
	(0.078)	(0.26)	(0.069)	(0.12)
Out of state	1.51***	0.041	1.23***	0.65***
	(0.092)	(0.21)	(0.098)	(0.10)
Voting assistance	0.026	0.18***	0.020	0.200***
	(0.049)	(0.040)	(0.043)	(0.028)
Changed name	-0.029**	-0.085***	-0.034***	-0.026**
	(0.010)	(0.019)	(0.009)	(0.008)
Name has middle initial	0.044**	-0.087***	0.016	-0.072***
	(0.013)	(0.012)	(0.013)	(0.015)
Name has middle name	0.044***	-0.066***	0.041***	-0.046***
	(0.009)	(0.007)	(0.010)	(0.013)
Name has apostrophe	-0.041***	-0.0086	-0.044***	-0.025
	(0.010)	(0.043)	(0.008)	(0.042)
Name has suffix	0.0035	-0.018	-0.004	0.012
	(0.009)	(0.017)	(0.010)	(0.011)
Name has hyphen	0.033***	-0.029*	0.00029	-0.027
	(0.0055)	(0.014)	(0.0034)	(0.020)
Intercept	-0.71*	-1.58***	-0.68**	-2.7***
	(0.30)	(0.36)	(0.24)	(0.41)
ρ	-0.39*		0.22	
	(0.16)		(0.12)	
Observations	9,505,204	2,731,319	8,255,083	2,636,496

Note: *p<0.05, **p<0.01, ***p<0.001.
Standard errors clustered by county. Includes county, age, and name length fixed effects.

Our model uses a probit link in both of its steps, and we estimate the model with maximum likelihood, once using data from the 2016 general election and a second time with data from the 2018 general election. Each iteration of the model yields two sets of estimates, one that pertains to selection into an election's VBM voter pool and a second that pertains the possible ballot rejection for individuals who did cast VBM ballots.

Selection model results

In Table 4, we present abridged results from our selection model (a full set of results is available from the authors). The table has both 2016 and 2018 sections, reflecting that we estimated the model twice, once for the 2016 general election and once for the 2018 general election. Each year has two sets of estimates, as explained above. We turn first to our model's selection step, which estimates who among voters in the 2016 and 2018 general elections in Florida cast VBM ballots. Insofar as our objective is understanding VBM ballot rejection, not the correlates of VBM casting in the first place, our discussion of the model's selection results is brief.

Correlates of casting a VBM ballot in the 2016 and 2018 general elections

The model's VBM selection coefficient estimates in Table 4's first and third columns ("Voted VBM") are largely consistent with existing literature (e.g.,

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[38]There are 27 United States congressional districts in Florida along with 40 state senate and 120 state house districts. Florida Senate District 40 is collinear to the collection of other districts, and we drop it from our list of instruments. As justification for our exclusion restrictions, we searched media outlets in Florida for reports of legislative campaigns differentially engaging with voters on the matter of VBM ballot rejection. If, for example, one congressional campaign were to have emphasized on-time VBM returns in particular, this would be problematic for our assumed restrictions. Our searches covered two time periods: October 1, 2016–November 8, 2016 (for the 2016 general election) and October 1, 2018–November 6, 2018 (for the 2018 general election). We uncovered no evidence that legislative campaigns (actually, any campaigns) in Florida publicized the subject of VBM ballot rejection and what VBM voters can do to ensure that their ballots count. Although we are confident that our exclusion restrictions hold for 2016 and 2018, it does not follow that they will hold in the future. It is possible that campaigns in 2020 and beyond will engage the matter of VBM ballot rejection in differential ways. Whether this happens remains to be determined.

white voters are heavy users of VBM voting), to the extent that scholars have examined the question of who is likely to choose to cast a mail ballot, but our selection model also identifies some unexpected findings.

As shown in Table 4, our results for the 2016 and 2018 general elections are qualitatively similar. In both elections, Democrats were more likely to vote by mail than NPAs, the reference category in our model for party. We find in 2018 that Republicans were no more likely than NPAs to cast VBM ballots, all else equal, and for many observers of Florida politics this might be a surprising finding, as Republicans in the state have long been assumed to dominate mail voting.[39] It is possible that Democrats in 2018 were especially likely to vote VBM due to the out-sized efforts of the Democratic Party of Florida to mobilize peripheral voters to the polls, encouraging supporters to vote by mail in a midterm election that had historic turnout.[40]

Turning to other determinants of choosing to vote by mail, Table 4 shows that, in the 2016 and 2018 general elections, white voters, the reference category for race and ethnicity, were more likely than Black voters to cast VBM ballots, all things equal. Although Hispanic voters were less likely than white voters to vote by mail in 2016, they were no more or less likely than white voters to cast a VBM ballot in the 2018 general election. We find a consistent result, across 2016 and 2018, that women in Florida are more likely than men to vote a mail ballot, all else equal.

Moving beyond party, race and ethnicity, and gender, we see in Table 4 that the likelihood of casting a VBM ballot by those needing voting assistance—which we take as a proxy for living with a disability—is not statistically significant, but, as expected, members of the military and their dependents are disproportionately likely to vote by mail. Similarly, voters overseas and out of state are substantially more likely to cast mail-in ballots.

Per Table 4, several name-related variables in the VBM selection step are statistically significant. We do not have any strong theoretical explanations for these results, however. For example, we find that individuals whose names have apostrophes were less likely to vote via VBM and that individuals with a middle name are more likely to vote by mail; this latter result obtains only in 2016. We control for name-related features of determining which individuals are more likely to vote by mail because our ul-

timate interest is in VBM ballot rejection. As to what is driving these results, this is an open matter we leave for future research.

Our selection model includes birth year indicator variables with 18 years of age as the reference category. In Figures 5a and 5c, we plot age-based coefficient estimates for VBM ballots cast in the 2016 and 2018 general elections, respectively. In both figures, the likelihood of voting by mail, ceteris paribus, is highest among older voters. Among those who cast ballots of any type in 2016 and 2018, voters under the age of 50 were quite similar regarding their proclivity to vote by mail, but then the rate of VBM voting increases steadily by age. There is a slight uptick in the probability of voting by mail among younger voters, with the rate slightly higher for voters between the ages of 19 and 25. But overall, Figures 5a and 5c show that, the older the voter, the more likely he or she votes by mail.

Finally, we find evidence of variation across Florida's 67 counties in the rates at which voters cast VBM ballots (not displayed in Table 4 but available from the authors). For purposes of illustration, all else equal in the 2018 general election, a voter's probability of casting a VBM ballot increases when registered in Pinellas County, compared to Alachua County, the home of the University of Florida. This result on Pinellas County provides intuitive confirmation that our selection model functions as expected.

Correlates of VBM ballot rejection in the 2016 and 2018 general elections

We turn now to the correlates of rejected VBM ballots in the 2016 and 2018 general elections and focus attention on the second and fourth columns ("Rejected VBM") of Table 4. These two columns present estimates that characterize the types of individuals who, conditional on casting a VBM ballot, are most likely to have their VBM ballots not count. Since probit model estimates are not easily interpreted on account of underlying model non-linearity, in that follows we offer average marginal effects for variables of substantive interest.

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[39]"Absentee ballots are typically Republicans' friends in Florida," according to veteran GOP operative Mac Stipanovich (see Allen 2020).

[40]In the 2018 election cycle, the Florida state Democratic Party claims to have "signed up 578,000 sporadic voters to receive mail-in ballots" (see Fineout 2019).
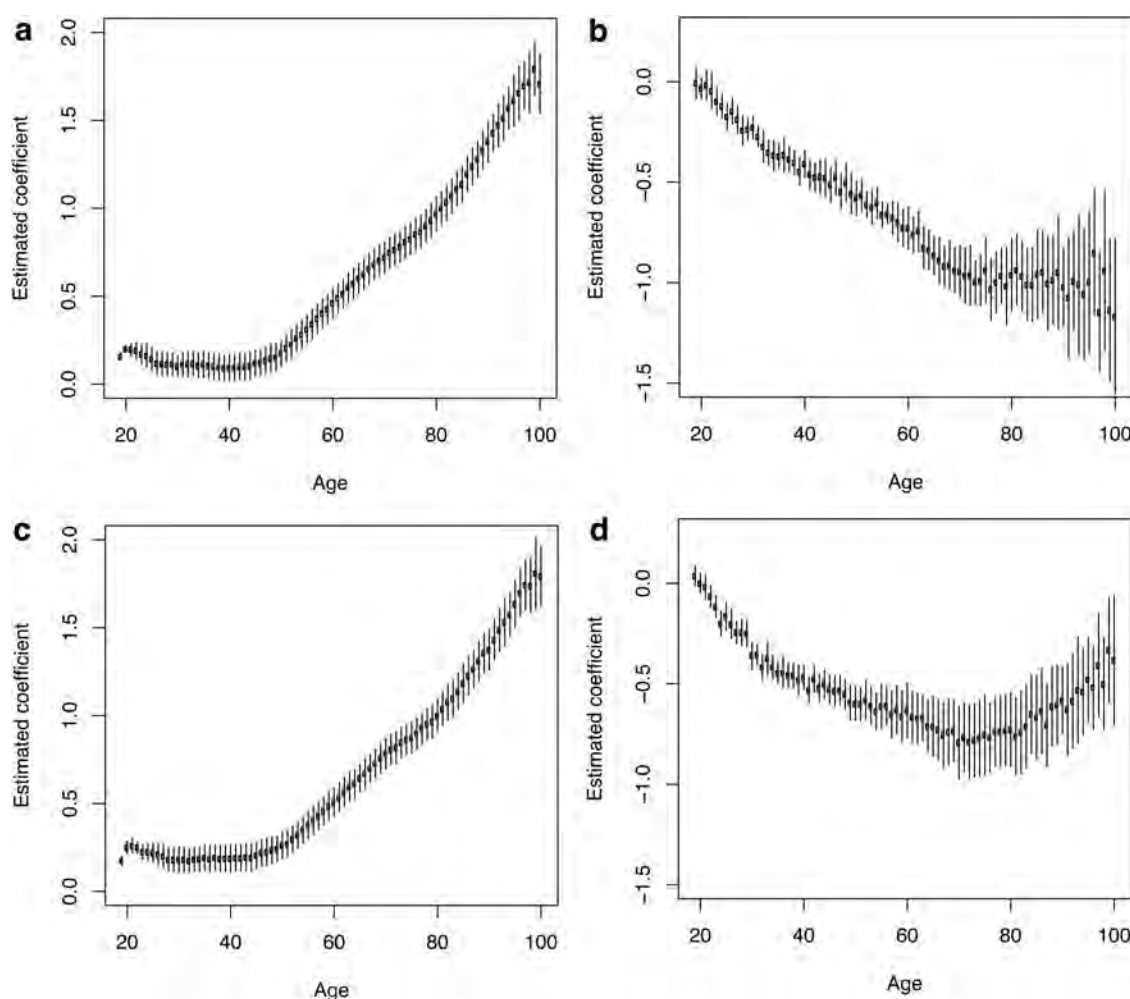
FIG. 5. Estimated age coefficients for vote-by-mail (VBM) ballot cast and rejected. **(a)** VBM ballot cast, 2016; **(b)** VBM ballot rejected, 2016; **(c)** VBM ballot cast, 2018; **(d)** VBM ballot rejected, 2018.

Our first set of marginal effects concerns party, race and ethnicity, and gender, and these can be found in Table 5. With regard to party registration (base category is NPA), the table reveals that in the 2016 general election Republicans had low VBM ballot rejection probabilities, all things equal. And in 2018, both Democrats and Republicans were significantly less likely to have their VBM ballots rejected, all else equal. These party-based findings comport with the notion that individuals registered to vote with a major political party may receive helpful guidance from partisan "get out the vote" and VBM campaigns that assist them in properly filling out and returning their VBM ballots. Regardless, Table 5 implies that VBM rejection in Florida in 2016 and 2018 was not neutral with respect to partisanship.

With regard to race and ethnicity, the reference category in our model is white. In Table 5, the only consistent finding across elections is that individuals in the "Other" race category have dispro-portionately high VBM rejection probabilities, all things equal. In 2016, VBM ballots cast by Black and Hispanic voters were rejected at higher rates than those cast by white voters, but low z scores for both indicates that the differences are not statistically significant at conventional levels. In the 2018 general election, we again find no significant differences between white and Black VBM voters with respect to ballot rejection, all things equal. However, we do find that Hispanic VBM voters had an elevated risk of ballot rejection, on the order of 0.18 percentage points.

The lower sections of Table 5 (both the 2016 and 2018 panels) present the corresponding marginal effects for gender, with the reference category female omitted from the table. We find no statistically significant evidence that VBM rejection

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TABLE 5. MARGINAL EFFECTS ON VOTE-BY-MAIL BALLOT REJECTION BY PARTY, RACE, AND GENDER

Variable	Estimate	SE	z
2016 general election			
Party: Democratic	-0.0094	0.0061	-1.55
Party: Other	-0.0045	0.032	-1.42
Party: Republican	-0.010	0.0050	-2.00
Race: Black	0.027	0.015	1.81
Race: Hispanic	0.0081	0.0062	1.30
Race: Other	0.012	0.0051	2.28
Gender: Male	0.0078	0.0050	1.55
Gender: Other	0.080	0.0044	1.82
2018 general election			
Party: Democratic	-0.20	0.091	-2.21
Party: Other	0.0025	0.075	0.03
Party: Republican	-0.24	0.058	-4.16
Race: Black	0.21	0.15	1.40
Race: Hispanic	0.18	0.089	1.97
Race: Other	0.24	0.070	3.42
Gender: Male	-0.0040	0.021	-0.19
Gender: Other	0.035	0.035	0.99

Note: Reports the change in the probability of VBM ballot rejection from a base category of have no party affiliation, being white, or being female to being a member of a given partisan, racial, or gender group, respectively. SE is an estimate's standard error, and *z* is an associated *z*-statistic.

TABLE 6. MARGINAL EFFECTS ON VOTE-BY-MAIL BALLOT REJECTION OF VARIOUS VOTER CHARACTERISTICS

Characteristic	Estimate	SE	z
2016 general election			
Voting assistance	0.016	0.0057	2.91
Military	-0.0078	0.0096	-0.81
Changed name	-0.0077	0.0030	-2.59
Military dependent	-0.0022	0.0054	-0.42
Overseas	-0.028	0.037	-0.75
Out of state	0.0037	0.017	0.21
Name has middle initial	0.0078	0.0049	-1.60
Name has middle name	-0.0059	0.0033	-1.79
Name has apostrophe	-0.00077	0.0039	-0.20
Name has suffix	-0.0016	0.0011	-1.50
Name has hyphen	-0.0026	0.0019	-1.33
2018 general election			
Voting assistance	0.42	0.14	3.10
Military	0.15	0.11	1.35
Changed name	-0.054	0.020	-2.66
Military dependent	0.21	0.12	1.78
Overseas	0.27	0.19	1.38
Out of state	1.4	0.20	6.71
Name has middle initial	-0.15	0.060	-2.52
Name has middle name	-0.096	0.046	-2.08
Name has apostrophe	-0.052	0.084	-0.62
Name has suffix	0.025	0.026	0.95
Name has hyphen	-0.057	0.048	-1.18

Note: Reports the change in the probability of VBM ballot rejection from a base category of not having the characteristic in the body of the table to having the specified characteristic. SE is an estimate's standard error, and *z* is an associated *z*-statistic.

rates in Florida in the 2016 and 2018 general elections varied as a function of voter gender.

Substantively, how large are the party and race and ethnicity marginal effects in Table 5? In the 2018 general election, for example, a difference of 0.18 percentage points in VBM rejection rates between Hispanic and white voters is not large on the surface. But according to the January 2019 statewide voter file, there were 2,337,804 and 8,872,107 Hispanic and white registered voters, respectively, in Florida. In the 2018 general election, the Hispanic turnout rate was 48.3 percent, quite low compared to the white turnout rate of 63.02 percent. Suppose that the Hispanic turnout rate in November 2020 is again 48.3 percent and suppose, hypothetically, that all Hispanics voted VBM. Holding constant all other factors, the 0.18 percentage point gap in VBM rejection rates is equivalent to a difference of 2,035 otherwise valid in-person votes cast by Hispanics that would, hypothetically, be rejected if they all voted mail ballots.

We now turn to Table 6 and its marginal effects associated with estimates of various voter characteristics, e.g., need for voting assistance, military status, and name features. There are two consistent findings across elections.

First, VBM voters who indicated at time of voter registration they would need assistance voting are,

all things equal, 0.02 and 0.42 percentage points more likely to have a rejected VBM ballot in the 2016 and 2018 general elections, respectively. This is indicative of a relationship between disability status, as proxied for by the need for voting assistance, and VBM ballot rejection, particularly in the 2018 election. Second, voters with changed names had lower likelihoods of VBM ballot rejection in both 2016 and 2018. Corresponding marginal effect sizes are not large, but they are statistically significant. We suspect that a changed name is proxying for voter engagement with an election official and updated voter record maintenance. A voter who changed his or her name presumably did so at an SOE office (or Department of Highway and Motor Vehicles office), and in the process placed a current signature on file.

Moving beyond findings in Table 6 that obtain in both 2016 and 2018, we also find that, in the latter year's election, VBM voters who reside in Florida but have an out-of-state mailing address had a 1.4 percentage point greater likelihood of VBM ballot rejection. This may reflect the fact that the ballot cure process in Florida was improved between

2016 and 2018. Ironically, the improvement may have benefited relatively local VBM voters in Florida, thus magnifying the effect of out of state status on VBM ballot rejection. We find no statistically significant evidence in either 2016 or 2018 that military status or military dependent status has an independent effect on VBM ballot rejection.

In terms of name-based features of VBM voters, there is evidence in 2018 that having a middle initial or middle name is associated with 0.15 and 0.10 percentage point decreases in VBM rejection probabilities, respectively. Corresponding estimates from 2016 are negative but not estimated sufficiently precisely to break the statistical significance barrier. In both 2016 and 2018 we find no significant effects on ballot rejection of the presence in voter names of apostrophes, suffixes, or hyphens.

We previously explained our logic regarding name features and VBM ballot rejection: the more features of a name, the greater the number of signature possibilities and thus opportunities for signature inconsistencies. However, to the extent that we have found a relationship between name features and VBM ballot rejection rates, it works in the opposite direction of what we anticipated. We can only speculate post-hoc about this, but one possibility is that individuals who have names with complicated features are extra attentive to their names and thus more likely to have consistent signatures. It is also possible that the types of individuals who even choose to list their middle names on voter registration forms are also the types of people who are consistent with their signatures. Based on our results thus far, name features merit additional research regarding signature matching, beyond the limited approach to this subject that we have employed here.

Although not displayed in Table 4, our selection model estimates the effect of name length on VBM ballot rejection. We noted above how the model includes indicator variables for name length ranging from four to 25. For both the 2016 and 2018 general elections, we find no statistically significant evidence that name length affects the probability of VBM ballot rejection.

With regard to a voter's age and the likelihood of casting a VBM ballot that does not count, Figures 5b and 5d plot probit point estimates and confidence intervals for age-based point estimates. The reference category is 18 years old, and it is evident that the likelihood of having a VBM ballot

rejected decreases with age. In terms of what those estimates mean substantively, Table 7 reports a variety of age group marginal effects on the probability of VBM ballot rejection. These effects describe the marginal change in VBM ballot rejection probabilities for the base category 18 year-old voter who moves to another age in the table.

The implication of Table 7 is straightforward: in both the 2016 and 2018 general elections, the older a voter, the less likely his or her VBM ballot will be rejected, all things equal. Compared to an 18-year-old voter, for example, a 30-year-old VBM voter in 2018 had a 1.5 percentage point decrease in ballot rejection probability; a 50-year-old voter had a two percent lower probability. Broadly speaking, these estimates show how VBM ballot rejection disproportionately affected younger voters in Florida in the 2016 and 2018 general elections. These marginal effects and Figures 5b and 5d are consistent with the claim that younger voters may not have a firm grip on their signatures or knowledge about how to fill out a return VBM envelope. Since an individual's signature is never the same, and signature stability is acquired over time, influenced by social and cultural conditions (Pirlo et al. 2014), young voters growing up in a digital world may not yet appreciate their signature as a permanent measure of their identity.

TABLE 7. MARGINAL EFFECTS ON VOTE-BY-MAIL BALLOT REJECTION BY AGE

Age	Estimate	SE	z
2016 general election			
20	-0.0065	0.0066	-0.99
30	-0.039	0.015	-2.52
40	-0.062	0.026	-2.43
50	-0.079	0.034	-2.33
60	-0.091	0.043	-1.99
70	-0.10	0.053	-1.94
80	-0.103	0.055	-1.89
90	-0.11	0.057	-1.88
2018 general election			
20	0.0042	0.15	0.03
30	-1.5	0.53	-3.00
40	-1.9	0.61	-3.07
50	-2.1	0.72	-2.99
60	-2.2	0.78	-2.81
70	-2.4	0.86	-2.83
80	-2.3	0.85	-2.77
90	-2.1	0.78	-2.69

Note: Reports the change in the probability of VBM ballot rejection from a base category of 18 years old to an age listed in the body of the table. SE is an estimate's standard error, and z is an associated z-statistic.

County variability in VBM rejection rates

We now consider disparities across Florida counties with regards to rejection rates of VBM ballots. To do this, we focus on county fixed effects that are part of the VBM rejection step of our selection model. There are 67 counties in Florida, and three of them—Baker, Hamilton, and Jefferson—had zero rejected VBM ballots in 2016 and in 2018. These counties are not part of our model.[41]

Our base category, chosen without loss of generality, is Pinellas County. The estimated fixed effect for Alachua County, say, captures the additional (or decreased) probability that a VBM ballot cast in Alachua County will be rejected compared to a VBM ballot cast in Pinellas County, all things equal. There are 63 total county fixed effects in the VBM rejection step of our selection model (and also in the model's first step, but that is not of interest here).

There are ostensibly uniform standards in Florida for determining whether the signature on a VBM return envelope is valid or not. This point we have already noted. However, we have also discussed the matter of local discretion, and our county fixed effects estimates are proxies for the extent to which local officials in Florida's counties have independent effects on VBM ballot rejection rates.

We find different county marginal effects in 2016 and 2018. With respect to the former, there are effectively no statistically significant county effects regarding VBM ballot rejection. This means that, once we control for voter characteristics (demographics, name features, and so forth), the county in which a VBM voter cast his or her ballot in the 2016 general election had no significant bearing on whether the ballot was rejected. This suggests that election official discretion at the county level played effectively no role in VBM ballot rejection in 2016.

In the 2018 general election, this situation is quite different. County marginal effects for VBM ballot rejection are displayed in Figure 6, and bars in the figure are sorted from largest to smallest. County names appear under each bar, and bars are colored based on statistical significance at the 0.05 level, black denoting significance and gray a lack thereof. Each bar is a change in the VBM rejection rate of moving from Pinellas County to a different county. As an aside, we do not display a 2016 version of Figure 6, and this is because effectively all bars are gray, indicating that county level marginal effects are not statistically meaningful.

There are two explanations for the 2018 variability in county effects apparent in Figure 6. One, local election official discretion. And two, a missing variable in the VBM rejection step of our selection model that is correlated with county. Given our non-experimental setup, we cannot completely rule out the latter explanation, but our model already includes all of the demographics available to us via Florida voter files. Given the ostensible connection between signature quality and VBM ballot rejection, it seems hard to imagine that, say, penmanship systematically varies across counties, given that our selection model controls for voter age, a voter's race and ethnicity, and so forth.

Many of the 2018 general election county marginal effects in Figure 6 are greater in magnitude than the marginal effects previously discussed, i.e., those concerning party, race and ethnicity, gender, and age. That by itself is a notable result, implying that the most important predictor in November 2018 of whether a VBM ballot cast in Florida was rejected may be the county where it was cast.

That a county's VBM rejection rate might vary over time should not be not surprising. For example, the tallest bar in Figure 6 is associated with Gulf County, which along with Bay County was hit by Hurricane Michael prior to the 2018 general election (Morris and Miller 2020; Zelin and Smith 2020). The Gulf bar height is over two percent, implying that VBM voters in Gulf County had more than a two percentage point greater likelihood of VBM ballot rejection than VBM voters in Pinellas County, all things equal in the 2018 general election. This is despite the observed difference in VBM rejection rates between Pinellas and Gulf being approximately 3.08 percent in 2018. Some of this 3.08 percent reflects voter demographics, which are incorporated in our selection model via inclusion of voter-level predictors. All told, there were 1,251 VBM ballots cast in Gulf County in the 2018 general election, and two percent of this number is about 25 (40 ballots were actually rejected in 2018).

Is two percent large? Gulf County is one of the smallest Florida counties based on voter registration, having 10,792 registered voters as of

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[41]This is because these counties exhibit what is called perfect separation. It is not possible to estimate a county fixed effect for VBM ballot rejection if all of the VBM voters in a county either had rejected ballots or none had rejected ballots, as was the case for Baker, Hamilton, and Jefferson in both elections.
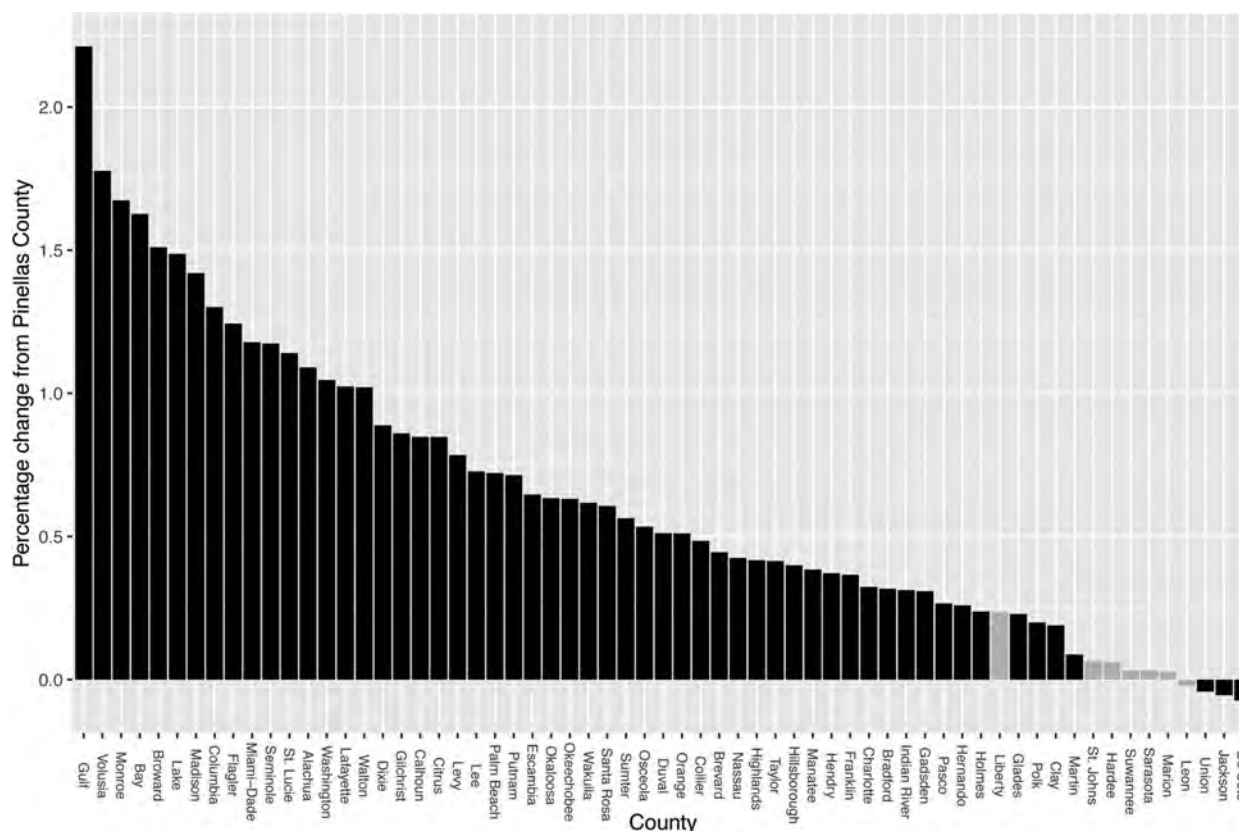
FIG. 6.   Estimated county fixed estimates, 2018 general election. *Note*: Each bar denotes one Florida county. Black bars are statistically significant at the 0.05 level and gray bars are not. Each county fixed effect is based on the omitted Pinellas County, and three counties (Baker, Hamilton, and Jefferson) do not appear in the figure because they had no rejected vote-by-mail (VBM) ballots in 2018.

November 2018, as opposed to 1.5 million in, say, Miami-Dade County. Of Gulf County's registered voters, roughly 6,000 voted in the 2018 general election. If in November 2020 all of these voters cast a VBM ballot, the aforementioned two percent rejection penalty in the county would lead to an excess of roughly 120 VBM ballots being rejected. This is unlikely to be pivotal in an election, which is a reflection of Gulf County's small population. These calculations, however, say nothing about the fact that a VBM ballot that is valid in one county but on account of discretion rejected in another reflects a lost opportunity for a properly registered voter to exercise the right to vote. We would argue that no voter's franchise should be considered expendable on the basis of not being pivotal. From this perspective, the question, "Is two percent large?" has nothing to do with pivotality.

Table 8 lists four Florida counties, their estimated marginal effects for VBM ballot rejection (i.e., the

additional percentage of rejected VBM ballots due to this county compared to Pinellas County), the standard error of the margin effects (all estimates are significant at the 0.05 level), and two columns named "New rejections" and "New percent." The latter two columns operate as follows.

Suppose that every county in Florida (disregarding the three counties that had no rejected VBM ballots) were administered like Pinellas County with respect to VBM ballot rejection. As Pinellas is our

TABLE 8. PROJECTED BALLOTS REJECTED
GIVEN HYPOTHETICAL SCENARIOS

County	Marginal effect	SE	New rejections	New percent
Volusia	1.776	0.471	32,216	1.224
Broward	1.511	0.427	32,131	1.221
Miami-Dade	1.179	0.280	32,025	1.217
Pinellas	0.000		31,648	1.202

SE, standard error.

reference category, this would mean that the marginal effect of Volusia County, for example, would be zero rather than 1.776. In this scenario, Volusia County would have had fewer rejected VBM ballots than it actually had in the 2018 general election (because zero is less than 1.776), and the amount fewer can be calculated by subtracting 1.776 percentage points from Volusia County's observed VBM ballot rejection percentage, dividing the difference by 100 to convert it to a rate, and then multiplying this rate by 80,667, which is the number of VBM ballots cast in Volusia County in the 2018 general election. Similar calculations can be made for all Florida counties under the assumption that each had a VBM ballot rejection rate like Pinellas.

This said, the "New rejections" column in Table 8 reports the estimated number of VBM ballot rejections across Florida in the 2018 general election in the hypothetical scenario in which all counties had the same fixed effect as the county in one of the table's rows. The "New percent" column lists the corresponding statewide VBM rejection percent. As Table 8 reveals, county variability in VBM rejection rates does affect rejections, but the raw numbers are not appreciably large compared to many Florida election vote margins. The reason that Volusia County appears in the table is because this county had the largest fixed effect (which means, the greatest VBM rejection rate, all things equal) among reasonably populous counties in Florida. With that in mind, the Pinellas-Volusia difference in rejected VBM ballots is 32,216 – 31,648 = 568 ballots. In other words, the difference in rejected VBM ballots in Florida between all counties decreasing their rejection rates to the level of Pinellas County versus all counties increasing their rejection rates to the level of Volusia County is 568 ballots. One perspective of the extent to which 568 is large turns on whether 568 ballots is likely to be pivotal in an election. Another perspective focuses on diminished voting rights: 568 VBM ballots rejected that would not have been rejected if all Florida counties had a Pinellas-like standard for VBM ballot rejection is 568 individuals who lost their franchise in an election.

What if the number of VBM ballots cast in Florida doubled?

There were 2,632,349 absentee ballots cast in Florida in the 2018 general election across the 64 counties with positive VBM rejection rates. If this number were to, say, double in the 2020 general election, the statewide number of rejected VBM ballots based on Table 8 ranges from 63,281 (if all counties were like Pinellas) to 64,439 (if all Florida counties were like Volusia). These numbers are calculated holding all things equal.

Holding all things equal is not a simple assumption here, and this applies to the thought experiment about what might occur in Florida if the state were to hold essentially an all-mail election in November 2020. Even though certain types of voters have disproportionately high VBM rejection rates (i.e., Hispanic voters in some cases), if these types of voters are more likely to turn out in an all-mail election, then the share of votes coming from them could increase. The issue here is the extent to which turnout effects (i.e., the extent to which the distribution of voter types changes with a shift to all-mail voting) interacts with VBM rejection rates. We have little information about what the electorate in Florida would look like if the state, hypothetically under siege from COVID-19, were to shift literally to VBM voting, and this should be kept in mind when extrapolating from our results to an election in which methods of voting differ greatly from what is typical in Florida.

As evidence that major changes to VBM voting rates can have unpredictable and large effects on ballot rejection, one need only look at recent elections in New Jersey and New York. In the former, the rejection rate of VBM ballots in elections held in 32 communities throughout the state on May 12, 2020 was roughly 10 percent. Nearby in New York City, approximately 20 percent of mail ballots were rejected in the June 2020 primary.[42]

Concern about these types of figures might induce county election officials in Florida to be sensitive to the exigencies of voting in a crisis and thus perhaps be more forgiving in their assessments of VBM signatures. On the other hand, if the number of VBM voters in Florida surges, many voters who have never voted by mail will suddenly be doing so. A surge of inexperienced VBM voters, particularly in what is expected to be a high-turnout election, may lead to an increase in the number of signature-related errors in November 2020. Ultimately, we do not know which of these factors will be stronger, but

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[42]On New Jersey, see O'Dea 2020. And on New York City, see Timm 2020.

the potential for multiple interacting forces on VBM ballot rejection is one that should be kept in mind as the push for VBM in the United States intensifies.

Correlation between VBM ballot casting and rejection

Finally, Table 4 contains two estimates—one for 2016, one for 2018—of a correlation parameter ρ. This parameter is a measure of the extent to which the two steps in the VBM process—casting a VBM ballot, or not, and having it rejected, or not—modeled in our selection model are correlated, conditional on observed predictors. The estimate of ρ is approximately −0.39 in 2016 and approximately 0.22 in 2018, with estimated standard errors of 0.16 and 0.12, respectively. Together these yield χ^2 statistics of 4.88 (p ≈ 0.027) in 2016 and 3.15 (p ≈ 0.076) in 2018.

There are two noteworthy points about these results, which may explain the lack of county marginal effects in 2016 as discussed above, plus the smaller (in magnitude) marginal effects on VBM ballot rejection for party, race and ethnicity, and age that we observe in 2016 compared to 2018.

First, the point estimate of ρ in 2016 is negative and significant. This means that, conditional on covariates, the type of individual in the 2016 general election who had a proclivity for casting a VBM ballot was also the type who was less likely to have a rejected VBM ballot. We arrive at this conclusion from the fact that the sign of the estimated ρ parameter in 2016 is negative and significantly so. Second, and in contrast, the point estimate of ρ in 2018 is positive and nearly significant at conventional confidence levels. A positive estimate of ρ implies that a voter in the 2018 general election who, conditional on covariates, was disproportionately more likely to cast a VBM ballot was also disproportionately more likely to be the type of individual who casts a VBM ballot that is rejected. In the case of the 2018 general election, this should raise a red flag.

An important question, one beyond the scope of this article, is thus: what changed between 2016 and 2018 regarding selection into VBM voting? Three possibilities come to mind. One, the 2016 and 2018 general election are different types, the former including a presidential contest. Perhaps midterm election voters are fundamentally different regarding the ways that they cast VBM ballots. Two,

across the United States, the 2018 general election had unusually high turnout for a non-presidential election. In Florida, turnout was particularly high among young and minority voters, driven in large part by the candidacy of Andrew Gillum, the Democratic Party's young African-American nominee for Florida governor, who lost in a close contest. A plethora of new VBM voters could have led to different types of VBM ballots cast. Three, as a result of a successful federal lawsuit immediately prior to the 2018 November election, registered voters in Florida were given more opportunity to cure their VBM ballot envelope if it had a problem with the voter's signature, having two days after Election Day to provide an absentee cure form. It is possible that expanded ballot cure opportunities provided additional leverage to local elections officials in 2018, allowing them to exercise discretion in a way that was not possible in 2016. These conjectures could explain the differences we have found in the correlates of VBM ballot rejection in 2016 and 2018, but they remain speculative at this point and a valuable subject for future research.

It is an open question whether in other elections in Florida and across other states there is a positive or negative correlation between the likelihood that an individual votes a VBM ballot and his or her ballot is rejected. Table 4's estimates of two correlations cover just two elections in one state. How much this result generalizes is unclear. Still, as the push for mail-voting grows in the shadow of the COVID-19 pandemic, a positive correlation between casting a VBM ballot and subsequent ballot rejection is a warning about the importance and potential difficulty of ensuring that all voters in American elections, those who vote VBM and those who vote in-person, have equal voices in political processes.

DISCUSSION

The spread of the novel coronavirus across the United States left the 2020 presidential primary season in disarray and ushered in a surge in vote-by-mail voting. Based on recent elections held during the COVID-19 pandemic, there is every reason to expect that we will see a dramatic rise in voters casting mail ballots in the upcoming 2020 general election.

Who is most at risk of VBM ballot rejection? Our results, focusing on Florida, highlight age, disability status, geography, and race/ethnicity. Simply, younger voters in Florida in the 2016 and 2018 general elections had disproportionately high VBM rejection rates, and the same is true for voters who need assistance with voting. With respect to geography, we have shown that, in the 2018 general election, some counties in Florida had VBM rejection rates that can raise an older voter's VBM ballot rejection probability, which is normally low, to a level approaching that of a younger voter. We also find that, across elections, non-white voters who cast VBM ballots, particularly Hispanics, are disproportionately likely to have their VBM ballots rejected.

Our empirical assessment of VBM ballots cast and rejected in Florida draws attention to present inequities—at the individual level and jurisdictional—that have affected VBM voting in the state. For example, if we were to apply the rejection rate of VBM ballots to ballots cast in person (early or Election Day) in Florida's 2018 general election, over 100,000 of the 8.2 million ballots cast would have been rejected, with those rejected disproportionately cast by young voters, those with disabilities, Hispanics, and individuals who are not affiliated with a major political party. As such, our findings should be of interest not only to scholars of voting rights but also to federal, state, and local election officials who are encouraging VBM voting in response to the COVID-19 pandemic. The findings suggest that a wholesale transformation in the United States away from in-person voting must be promulgated carefully if those implementing this transformation want to ensure that ballot rejection rates do not disproportionately affect some voters more than others.

Our results provide an important caveat to recent research concluding that the use of VBM ballots has a marginal impact on turnout and does not affect the partisan balance of elections. For example, in their study of three decades of elections in two states, Washington and Utah, that gradually adopted mail voting over time, Barber and Holbein (2020) find that mail voting does not preference one party over the other. Similarly, Thompson et al. (2020) examine turnout in three states, California, Utah, and Washington, that staggered implementation of VBM from 1996–2018, finding that neither Republicans or Democrats benefited from a greater share of their supporters turning out to vote. If, as we

find in Florida across two general elections, certain groups of voters—in particular, younger, disabled, racial and ethnic minorities—are more likely to have their VBM ballots rejected due to signature issues, and if, as there is every indication, more of these voters cast mail ballots in the 2020 general election rather than voting in person, there is certainly the possibility that outcomes of electoral contests may hang in the balance due to a higher rate of mail ballots cast by these voters not counting.

We also note that our study of rejected VBM ballots in Florida likely only captures the tip of the iceberg when it comes to VBM ballots that do not count. Our study of rejected VBM ballots cast in Florida is restricted to mail ballots returned on time to local election officials, excluding domestic VBM ballots that arrived at a proper local election office *after* the state's 7:00 p.m. Election Day deadline.[43] In our study, late ballots were never formally cast, and thus, are not included in the rejection rates. There is every indication that there will be postal delays in the November 2020 general election, as the United States Postal Service itself has warned (Cox, Bogage, and Ingraham 2020). Our study also does not consider VBM ballots that were "undeliverable," i.e., that never reached their intended voters. Unlike regular mail, VBM ballots may not be forwarded to a voter.

In addition, our study does not address barriers in states beyond Florida that may make it difficult for some voters to request or return their VBM ballots. In some states with all-mail voting systems (like Washington) or those temporarily pushing mail voting due to COVID-19 (like Georgia), only active registered voters are automatically sent mail ballots—this excludes eligible voters on the rolls who are listed as inactive.[44] Even in states where voters do not need an excuse to request a VBM ballot, many require voters to request a mail ballot in writing, well in advance of Election Day.

Though the public health threat of the ongoing pandemic raised the importance of voting by mail, many concerns over the equity of voting by mail

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[43]See above for our discussion concerning the handful of counties with late-ballot rejection reporting exceptions.

[44]For Washington's law, see Wash. Rev. Code § 29A.40.010, "Ballots by Mail," available at <https://app.leg.wa.gov/RCW/default.aspx?cite=29A.40&full=true> (last accessed April 15, 2020); for Georgia's decision in 2020 to mail ballots only to active voters, see Niesse 2020.

are not new. Across the country, United States Postal Service mail delivery and pickup in some jurisdictions is neither regular nor reliable; some prospective VBM voters might not have their ballots delivered expeditiously (Government Accountability Office 2006). Some local election officials include pre-paid postage on their VBM return envelopes; not including pre-paid postage could impede some voters from returning their ballots (see Merelli 2018). Mail in some zip codes does not process letters with postmarks, even in states where the deadline for returning a VBM ballot is Election Day; it can be impossible to pinpoint the date on which a ballot was returned (see Chapin 2020). And many voters with disabilities or those who have limited English proficiency may not be able to vote privately or independently by mail (see Wilkie 2020).

There are many open questions concerning voting by mail, and these questions are increasingly salient in a world where social distancing is important. Because of the heterogeneity in the adoption and regulation of VBM systems across the American states, case selection is important in any effort to identify why some registrants may be more likely to cast a mail ballot (Kousser and Mullin 2007), and, just as significantly, why some voters may be more likely to have their mail ballot rejected. Florida's longstanding system of mixed voting—which does not require registrants to have an excuse to vote by mail, allows them to opt-in to receive a ballot prior to Election Day, and is relied upon by Republicans and Democrats alike—is a valuable case to better understand the considerable discretion that local election officials have when it comes to making sure all voters casting a mail ballot have an equal opportunity to have their vote count.

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Appendix

APPENDIX A1. VARIABLE DEFINITIONS

This appendix describes the variables that we use throughout the article. All of the data are drawn from statewide voter files "(Voter Detail" and "Voter History") and statewide Legislative Report Election/Recap files from January 2017 and January 2019 maintained by the Florida Division of Elections.

- *Age.* Available from the Florida voter file in date format. Only the 49,485 registered voters with records exemptions are missing birth dates. For the rest, we transform birth dates to age at the time of the 2018 general election. We exclude 1,155 registered voters who have ages which fall outside of 18–100 years.
- *Party affiliation.* Available from the Florida voter file. Collapsed to include Democrat, Republican, NPA (no party affiliation), and all other parties ("Other"). No voters are missing party affiliations.
- *Race.* Available in the Florida voter file. We code a voter's race and ethnicity as white, Black, or Hispanic, collapsing all other entries as "Other." No registered voters are missing a race and ethnicity code in the voter file, although eight contain an invalid value in the field and are thus placed in the "other" category.
- *Gender.* We rely on a voter's stated gender ("M" or "F") in the Florida voter file, coding those with no code as "Other." 5,476 individuals are categorized as "Other" as a result of a missing gender field, and 43,237 registered voters already had an "U" ("Unknown") gender as coded in the voter file.
- *Military status.* From the January 2019 Recap voter file, this variable comes as a "Y" or "N."
- *Military dependent.* This field is taken from the January 2019 Recap voter file, in which it is "Y" or "N."
- *Voting assistance.* From the January 2019 Recap voter file, this variable is either "Y" or "N," identifying voters who indicate that they have a disability when they register to vote. There are 23 registered voters with erroneous codes.

- *Overseas.* Available as a "Y" or "N" item from the January 2019 Recap voter file.
- *Out of state.* We create this variable from registrants' mailing states in the voter file. Coded as one if a voter's mailing state is not Florida; otherwise coded as zero. Our assessment of state abbreviations is case-insensitive.
- *Changed name.* Derived from the January 2019 Recap voter file, which contains a voter's previous name, if an SOE ever had a different name on file. We create a variable which takes a value of one if there is any number of characters in this field and zero if the field is empty.
- *Name has middle initial.* We say that a registered voter has a middle initial if the voter's middle name field in the voter file contains one letter.
- *Name has middle name.* We say that a registered voter has a middle name if the voter's middle name field in the voter file contains more than one letter.
- *Name has apostrophe.* From a registered voter's name in the voter file, we create a variable which takes a value of one if the voter has at least one apostrophe in their first, middle, or last name fields.
- *Name has suffix.* From a voter's name in the voter file, we create a variable which takes a value of one if the voter has a suffix in the designated name suffix field. Our set of standard

APPENDIX TABLE A1. DROPPED RECORDS FROM THE 2016 AND 2018 FLORIDA VOTER FILES

Exclusion criteria	2016	2018
Records exemption	48,429	49,485
Invalid flags	8,470	23
Florida Senate District 0	2,093	1,048
Age range	1,297	1,155
Missing flags	1,013	273
Congressional district 0	381	19
Missing name	40	31
Total	61,723	52,034

name suffixes is as follows: "Jr," "Sr," "I," "II," "III," "IV," "IX," "V," "VI," "VII," and "VIII." Our assessment of whether a registered voter has a standard name suffix is insensitive to case and punctuation.
- *Name has hyphen.* From a voter's name in the voter file, we create a variable which takes a value of one if and only if the voter has at least one hyphen in his or her first, middle, or last names.
- *Name length.* Defined as the number of characters in a voter's first and last name. There are registered voters in the voter file who are missing a first or last name.

Based on the above definitions, we drop 52,034 individuals who voted in the 2018 general election (out of 8,307,118, approximately 0.63 percent). These individuals are broken down in Appendix Table A1.